

COAL AGE

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No. 8

It might as well be understood that the "good old days" are gone for good. The "good old days" of careless haste, enormous profit, sinful waste, are dead and done and have been cast out on the culm heap of the past.

New times are here, new days, new ways, and "forward" we must turn our gaze—set forth upon a modern track and never think of turning back. If there are bills which must be paid for blunders that our fathers made, we might as well make up our minds to pay them. We need our skill and common sense, our tact and our experience, and now's the time for coal men to display them.

The labor problem is ours to face at almost every time and place, and ancient force and brutal power are *not* the methods of the hour. We cannot trample underfoot with ruthless strength and iron boot the mighty hosts of labor. The man who mines the good black coal is *not* a blind and brainless mole, but human, with a *mind* and *soul*—a brother and a neighbor.

Yes, we must deal with discontent because of ways our fathers went, because they somehow wouldn't see the lesson of humanity. It's not by guns and high stockade that wage agreements can be made; it's not by guards and strong redoubt that peace and calm are brought about. But we must keep our passions cool and give the gentle golden rule some practical expression, and meet the men who toil and sweat for all the tonnage that we get, with just and fair concession.

The "good old days," thank God! are done, a better time has just begun, a time for which we've striven; a time to heal each wound and sore; a time to love our brother more, forgive—and be forgiven. We have our problems grim and great, our legacy of wrong and hate, but we shall reach a nobler state, with less of toil and sorrow. The bitter past is dead and gone, and progress still goes marching on to greet that bright and rosy dawn—The Dawn of a Tomorrow!

Berton Braley

Post Timbering at the Working Face

BY J. T. BEARD

In considering methods of reducing mine accidents there is no subject of greater importance than that of timbering the working face. More than one-half of the fatal accidents in mines are due to falls of roof and coal, as the direct result of either a lack of proper timber or faulty methods or systems of timbering. Mine officials throughout the country have expressed their willingness and desire to coöperate with mine inspectors and mine legislators, in an effort to secure greater uniformity of remedial action in respect to determining and adopting the most efficient methods and systems of mining.

Aside from the knowledge and skill required in the placing of mine posts in a working place, it is the miner's own neglect that, in the large majority of cases, is responsible for his injury. There is an old saying: "Time and tide wait for no man"; and none the less true is it that *a falling roof never waits for a miner to load out his coal before setting a post or two, needed to make his place safe.*

Few miners—a small percentage only—learn the lessons their procrastination should teach them; and a still smaller number can ever be expected to profit by the misfortunes of their fellows. This habitual disregard of safety is, therefore, an element of human nature that must be recognized as ever present, and one that it will be needless to dwell upon at any considerable length, in the present discussion. Instead of wasting time and valuable space in a fruitless attempt to enlarge upon the well known failings of men, let us have the practical suggestions of practical men, setting forth ways and means of improving conditions as they now exist at the face, and advocating the adoption of systems that shall tend to eliminate the human factor, which is so largely responsible for the daily recurrence of fatal mine accidents.

There are many intelligent miners today who have but an imperfect knowledge of the simple rudiments and principles of post timbering. They make no study of the nature of the roof under which they work, or its mode of action. They regard faults and dislocations in the strata, only in the sense that these cut out the coal and

make the work of mining more laborious, not to say necessarily more dangerous. Many miners set a post in a mine, as they would shore up a building that was liable to fall. It does not once occur to them that this same mine post, aside from the slight support it affords to the roof slate, acts or should act as a silent but faithful monitor of impending danger, to a careful and observant miner.

An Outline of The Next Question for General Discussion

timbering; should a miner be compelled to timber his own place and be held responsible for the proper performance of this work, or should special timbermen be employed for the purpose; should the bark of mine timber be removed before it is sent into the mine; when should mine timber be cut and how should it be stored; what methods, if any, should be employed for its preservation? These are some of the practical questions that can be discussed with profit, with a view to increased safety and economy in the operation of mines.

On the other hand, there are many theoretical questions of equal importance, such as the relative diameter and length of mine posts, to secure the greatest efficiency in service; the calculation of the load a mine post can properly be expected to support; the crushing strength of mine timber; the effect of seasoning, and other like questions. Owing to the growing scarcity of timber in mining regions, the use of steel timber in mines, and its preservation from the corroding action of mine water, are questions of growing importance.

It is the plan of COAL AGE to confine each of these discussions to one month, except it should be found advisable to extend this time, in any case, owing to the interest manifested and the importance of the matter discussed. It is, therefore, important that all who are seeking to improve methods and systems in mining coal should take part in the discussion as early in the month as possible.

A Modern Mine Ventilating Plant

BY U. U. CARR*

SYNOPSIS—This plant was built with the ideas of efficiency and economy predominating in the design. The rope transmission between motors and fan is a departure from ordinary practice and one which possesses many advantages over the customary and time-honored belt drive. The arrangement of sheaves and clutches to obtain operation from either motor independent of the other is also particularly worthy of notice.

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The pre-eminent ideas governing the design of the ventilating equipment of the Monongahela River Consolidated Coal & Coke Co.'s Crescent Mine, located near California, Washington County, Penn., were to provide against interruption of service, and to secure a permanent, fire-proof construction that would endure throughout the life of the mine, combined with the highest possible efficiency of the fan.

The desirability of continuous operation is easily appreciated and, in emphasis of the importance of perma-

ring in the main airway. The explosion doors are located in the side of the fan drift, directly in line with the main air course.

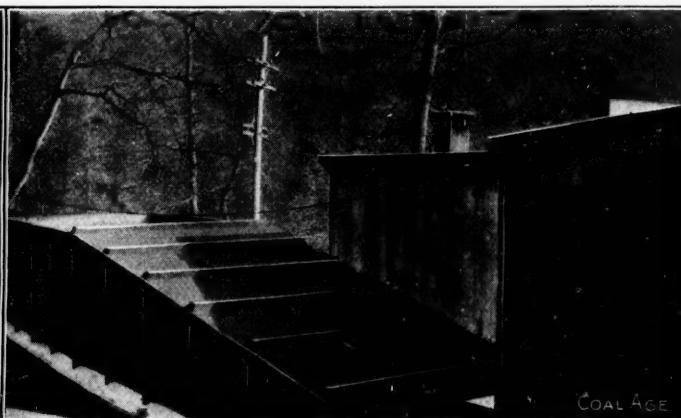
These air ways are lined with concrete through the faulty strata overlying the coal near the outerop. For this work, plank forms were used on the side walls, and Hy-Rib sheets bent to the proper radius were used as forms for the segmental arch roof. After the concrete arch was placed on these sheets, the under side was plastered; the Hy-Rib sheets forming the steel reinforcement for the arch.

The minimum thickness of concrete on the side walls was fixed at 6 in., and where the space to be filled was much greater than this, cyclopean masonry was employed. The haunches of the arches were cut into the rock, and the space above packed with broken stone in the usual manner.

The concrete airways and fan drifts are proportioned to carry the output of the fan with a maximum velocity



GENERAL VIEW OF FAN HOUSE



EVASE CHIMNEY, SHOWING PILASTERS

inent construction, it may be said that with an output of 6000 tons daily the estimated life of this mine is 35 years.

Cost of power is apparently often disregarded or passed over with the thought that the generation of a few extra horsepower will show no appreciable increase in the expense of operation, but the fact remains that every horsepower generated, represents an expenditure of money.

In the case of this installation, each per cent. increase in efficiency means a saving of approximately four horsepower, or say \$400 annually; an amount justifying a considerable outlay, tending to increase the efficiency.

For the fulfillment of the above conditions, several innovations were employed. Chief among these may be mentioned the duplication of the driving machinery, self-closing steel explosion doors, reinforced-concrete construction, extra large airways and an evase chimney of unusual strength.

POSITION OF FAN AND HOUSE

The center line of the fan drift intersects the main airway at an angle, and the fan and motor house are removed from the direct force of any explosion occur-

of 1500 ft. per min., at which speed the frictional losses in them are negligible.

The fan drifts are constructed entirely of reinforced concrete and were poured in plank forms. The side walls are 6 in. thick, stiffened with pilasters and reinforced with vertical and horizontal sets of $\frac{3}{8}$ -in. diameter bars, spaced 18 in. centers and wired together at each intersection.

A flat slab, 4 in. thick reinforced with $\frac{3}{8}$ -in. diameter bars spaced 10-in. centers, forms the roof over the fan drifts. To reduce the span of the roof slab, reinforced-concrete beams were arranged crosswise and along the center line of the structure, so as to not interfere with the drainage of water from the roof.

These beams rest on the pilasters of the side walls and project upwards from the roof, leaving the interior free of obstructions. The roof slab was finished with a $\frac{3}{4}$ -in. coat of cement plaster, waterproofed with Trust-Con waterproofing paste, afterwards heavily coated with asphalt paint.

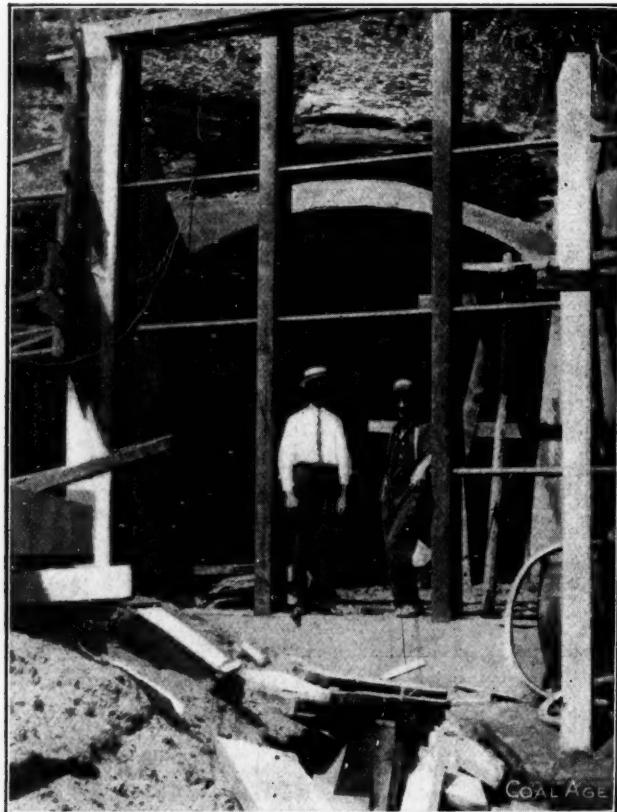
LOCATION AND CONSTRUCTION OF EXPLOSION DOORS

The explosion doors, located in the side of the fan drift facing the main airway, cover an opening equal to and coinciding with the projected area of this pas-

sage. While the impossibility of constructing a door that would withstand the force of a severe explosion without damage was well understood, the intention was to provide a device which, if not completely wrecked, would automatically close and thus restore the ventilation.

Manifestly the size of the opening (15 ft. by 17 ft. 10 in.) rendered the use of single or double doors impracticable on account of their inertness to the explosive force and their momentum when in motion.

In the design adopted, sixteen overlapping doors were used, each one capable of opening or closing independently of the others. These were made of $\frac{3}{8}$ -in. steel plates, hung on $2\frac{1}{4}$ -in. diameter axles by means of $2\frac{1}{4} \times 7\frac{1}{8}$ -in. wrought-iron hinges, which extend the full



EXPLOSION-DOOR FRAME AND PIT MOUTH DURING ERECTION

width of the plate. The doors are further stiffened by a $3 \times 2 \times 1\frac{1}{4}$ -in. angle, riveted along the lower edge and arranged to lap on the upper edge of the door below.

The frame supporting the door axles consists of five vertical 12-in. I-beams tied together by a 12-in. channel at the top and a plate and angle at the bottom. The door axles extend the full width of the opening and pass through holes drilled in the webs of the beams.

The concrete was built around this frame, and is so interlocked with it, that it can be displaced only by the destruction of the walls. The axis of the hinge, being located near the tops of the doors and two inches from the vertical plane, causes them to close against the I-beam frame, by gravity, where they are tightly held by atmospheric pressure.

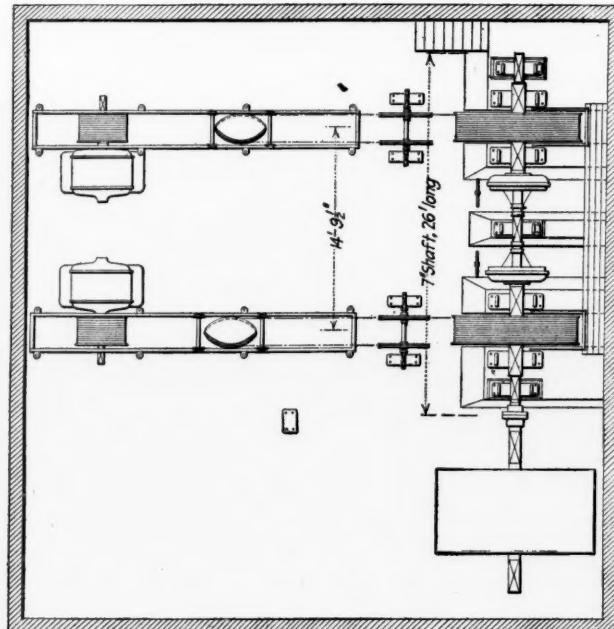
In this connection it may be said that for this mine it was not considered necessary to have a reversible fan.

It, therefore, was designed primarily for exhausting and no provisions were made for operating it as a blower.

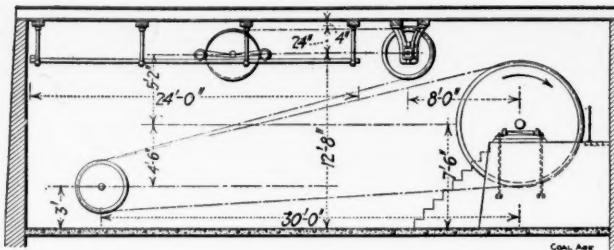
TYPE AND SIZE OF FAN

The fan is a double inlet "Sirocco" type, manufactured by the American Blower Co., and was designed to deliver 350,000 cu.ft. of air at 157 r.p.m. against a 5-in. water gage. The wheel is 13 ft. in diameter and 6 ft. 9 in. wide, driven by a central hub, mounted on a shaft 10 in. in diameter, which is reduced to 8 in. in diameter at the Journals.

The fan shaft extends into the motor house and is



PLAN OF FAN DRIVE



SIDE ELEVATION OF FAN DRIVE, SHOWING IMPORTANT DIMENSIONS

carried in three adjustable bearings, one mounted on a concrete pedestal within the house itself, while the other two rest on bridges in the fan inlets. These bridges are of unique design, being constructed of $\frac{1}{2}$ -in. steel plate, so disposed as to offer a minimum resistance to the flow of air through the inlets.

Only the inlet cones and upper half of the fan casing are steel plate; the lower half and the evase chimney are of concrete construction.

Theoretically, the maximum water gage effect and efficiency of an exhaust fan would be realized were it possible to extend the chimney with an increasing area to that point, where the velocity of the air discharged would be zero. This, of course, is impossible and subject to practical limitations, but that chimneys of greater length than those usually employed, would result in increased efficiency, is not doubted.

The chimney in this case is about 40 ft. long from the point of cutoff to the end of the evase portion. For practical reasons it was placed in a horizontal position, representing the usual vertical arrangement of chimney and casing rotated through an angle of 90 deg. Beyond the evase portion, the bottom is inclined upward and the discharge opening made horizontal, so that the outflow of air is not appreciably affected by the direction of the wind.

That portion of the stack below the ground line is made of plain concrete, poured in plank forms. The remainder of the stack is constructed of Hy-Rib sheets supported on a steel frame and plastered with cement mortar.

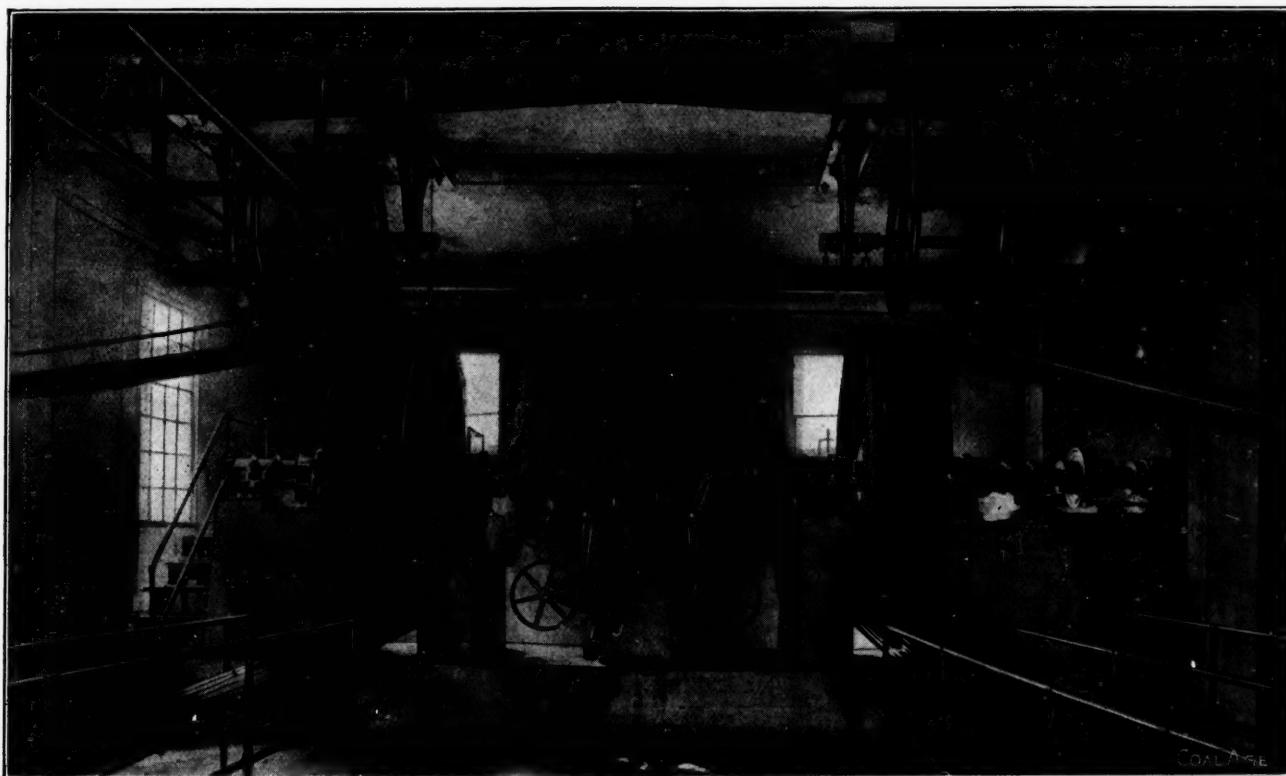
The frame consists of 4-in. I-beam posts spaced about 6-ft. centers, tied together at the top and bottom with

with extended sub-base; speed variation being accomplished by means of resistance in the secondary circuits.

The stacks of grid resistance for each motor are enclosed with expanded metal and provided with a face plate controller. The switch board equipment consists of two indicating wattmeters, one recording wattmeter, and two triple-pole automatic oil switches with low voltage release and inverse time limit overload relays.

With the exception of the incoming lines, which are carried in the ceiling, all wiring for the motors is placed in conduits under the floor. Current for lighting is furnished by a 110-volt transformer from the high-tension line, the wiring being run in small pipes.

To provide for increased ventilation in an emergency, the rope sheaves are proportioned to operate the fan at normal speed with a motor speed of 400 r.p.m., so that



THE TWIN ROPE DRIVES AND CLUTCHES

angles. The latter were used mainly to facilitate erection, rather than as a necessary member of the frame. The cover is carried on 6-in. I-beams which rest on the posts, and the Hy-Rib sheets are secured to the inner sides of the beams by steel clips made for that purpose.

To carry the plaster coat, strips of metal lath were stretched over the projecting beams and fastened on either side to the Hy-Rib sheets. This gives the appearance of small pilasters on the wall, and encloses the steel beams in concrete. On the sides of the chimney the finished concrete is 2 in. thick, while the roof slab is $2\frac{1}{2}$ in. thick.

POWER TRANSMISSION TO THE FAN

The fan is driven by manilla rope transmission from two Allis-Chalmers Co.'s 300-hp., 450-r.p.m., 2300-volt, 60-cycle, three-phase-wound rotor, variable-speed, induction motors. These are of the three-bearing type

full motor speed would run the fan at 172 r.p.m., or ten per cent. above normal.

The rope transmissions are the Dodge Manufacturing Co.'s American or single rope system, each carrying sixteen wraps of 1-in. manila rope, and are duplicates in every particular.

The motor sheaves are 42 in., and the driven sheaves 107 in. in diameter. These latter are mounted on hollow or quill shafts through which a 7-in. jack shaft passes. The jack shaft is rigidly connected to the fan axle with a flanged coupling and is engaged by 48-in. Dodge patent split friction clutches bolted to flanges on the ends of the quill shafts and operated by handwheel and pinion.

The quill and jack shafts are supported independently in adjustable bearings, resting on concrete pedestals, which are joined by a continuous concrete footing to prevent uneven settling.

The motors are set 30 ft. centers from the jack shaft, which gives sufficient room to operate the tension carriages inside the building. The winding sheaves and tension carriage tracks are placed directly above the driving ropes, and are bolted to timbers which are in turn secured by anchor bolts to concrete leveling pads on the under side of the roof. With this arrangement, extreme accuracy in setting the anchor bolts is avoided and the alignment of sheaves and tracks greatly facilitated.

Pipe hand railings are provided around the sheaves and ropes while the clutches are protected by expanded metal guards.

Either drive can be thrown in or out without changing the speed of the fan, in fact the sheaves and clutches on the quill shafts being split, one drive could be dismantled without interfering with the operation of the other.

The ropes run exceedingly smoothly and are practically noiseless, and in addition when worn out their replacement is a matter of small expense.

SIZE AND CONSTRUCTION OF MOTOR HOUSE

The motor house proper is 30 ft. wide by 45 ft. long, with an irregular addition to its width where it joins the

plain concrete as are those under the sides of the fan drift. Trussed Concrete Steel Co.'s standard reinforcing and waterproofing materials were used throughout the work.

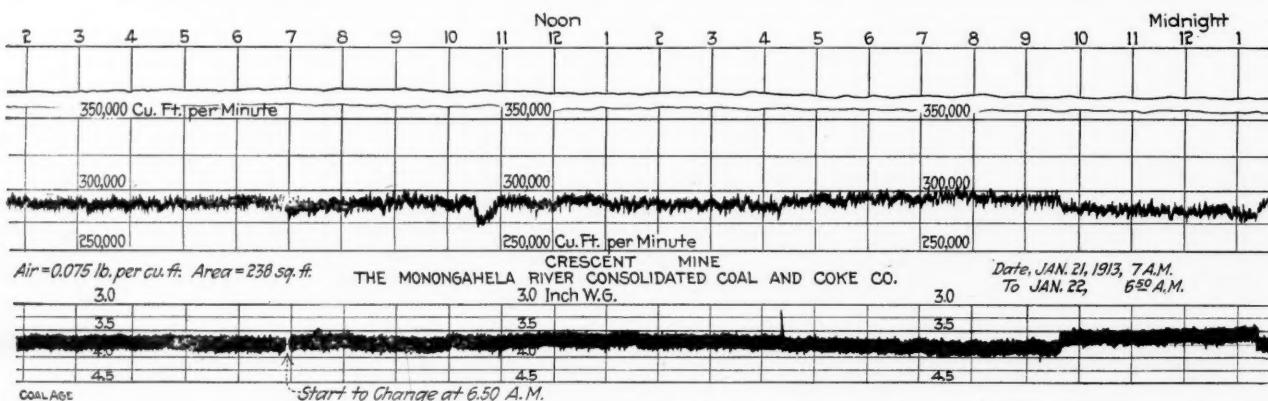
In addition to the usual water manometer required by law, the fan is equipped with a Hydro Manufacturing Co.'s recording gage, which indicates both the pressure and the volume of the air delivered. The recording pens of this instrument are attached to floats resting on water and move up or down by the action of the air on Pitot tubes stationed in the main airway. This instrument is quite sensitive and faithfully records any variation in conditions.

The fan when running at 147.4 r.p.m. will deliver 322,470 cu.ft. of air at 4.97 in. water gage. Its mechanical efficiency is remarkably high, ranging between 79 and 83 per cent.

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Mining Steep Seams in South Wales

At the southern outcrop of the South Wales coal field, the seams are usually steep, having a dip of from 17 to 27 deg. Shafts are not common in this field; instead, advantage is taken of the outcropping and the seam is followed inward and downward with a pair of main



HYDRO CHART. RECORD OF FAN PERFORMANCE FOR 24 HOURS

fan drift and chimney. It is also of concrete construction.

The roof slab is 5½ in. thick, reinforced with ½-in. and 5/8-in. steel bars, and has a rise of 8 in. at the center. Reinforced concrete beams projecting above the roof and resting on columns carry this slab and leave the clear height under the roof unobstructed for the accommodation of the rope drives.

The concrete columns, ten in number, are 12x12 in., reinforced with four 5/8-in bars. Plank forms were used for the columns, beams and roof slab but the motor house walls are constructed of Hy-Rib sheets, placed horizontally and plastered with cement mortar and are 2 in. thick.

The ends of the Hy-Rib sheets are secured in grooves in the columns, and are also attached to 3x3x1/4-in. angle posts, which are set in the concrete and support the door and window frames. A surface coat of cement plaster, waterproofed with Trus-Con waterproofing paste was applied to the sides and roof of the motor house. The latter was also heavily coated with asphalt paint.

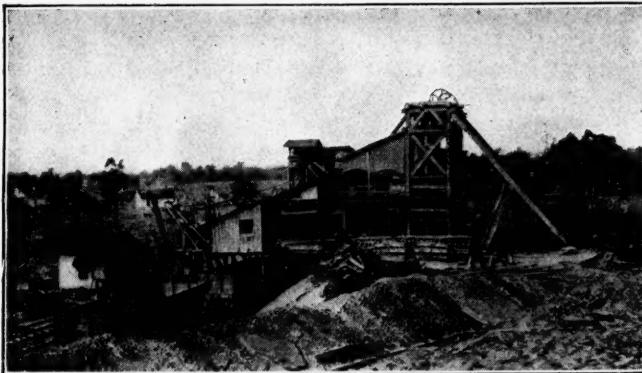
The foundation walls under the motor house are of

slopes. This method permits quick travel, provides plenty of fuel available for power, and water gives less difficulty than if a vertical shaft crossed the measures. Large pillars are left along the main slopes for protection against caves, also as the mine deepens substantial pillars are left against the outcrop to prevent the percolation of surface water.

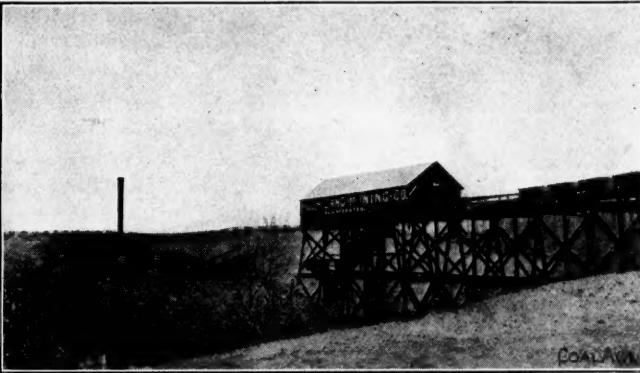
Where more than one seam is to be worked, connection is made by cross-measure headings driven horizontally and the coal taken out through the seam in which the slopes have been driven. Often an inferior seam unfit for working, is chosen for the main haulway, simply because it has a good roof.

The Park Slip modification of longwall mining is used. Level headings are driven every 100 or 110 yd. Ventilation is secured by driving a roadway, about 50 yd. distant from the slope, through the block of coal to the level above; an airway is then driven from this cross-cut, parallel to the level heading which leaves a rib of coal 22 yd. wide between, which is cut through every 25 yd. for ventilation, thus forming pillars 25x22 yd. along the upper side of the level. These are allowed to stand until the level is worked out.

SNAP SHOTS IN COAL MINING



MINE OF VICTORIA COAL CO., MADISONVILLE, KY. SHAFT IS 220 FT. DEEP. TIPPLE LOADS 675 TONS PER DAY. COAL IS UNDERCUT WITH PUNCHERS



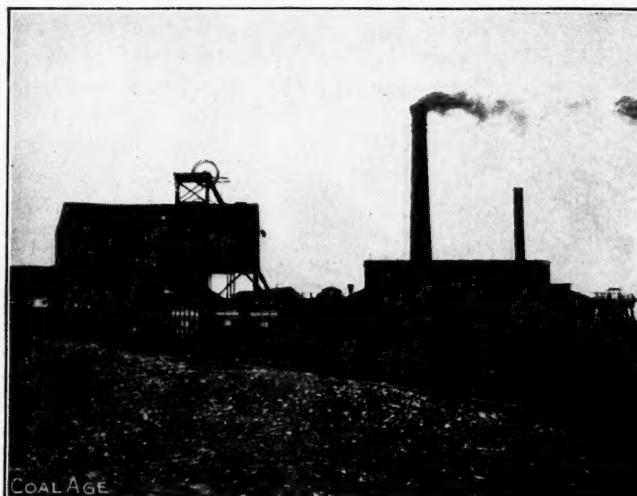
SURFACE PLANT OF HIGHLAND MINING CO., PROVIDENCE, KY. A 700-TON MINE, VENTILATED BY A 16-FT. CRAWFORD AND McCORMICK FAN



NORTHWESTERN IMPROVEMENT CO.'S NO. 3 TIPPLE, IN THE ROSLYN, WASH., FIELD



TOWN OF RONALD AND NO. 3 TIPPLE OF NORTHWESTERN IMPROVEMENT CO., NEAR ROSLYN, WASH.



TIPPLE AND POWER HOUSE, CALEDONIA MINE, DOMINION COAL CO., GLACE BAY, N. S.



SHOWING TIPPLE AND LOADING SHED, NO. 5 MINE OF NORTHWESTERN IMPROVEMENT CO., ROSLYN, WASH.

Gas and Oil Wells in Coal Fields

BY GEORGE S. RICE*

SYNOPSIS.—Much pressure has been brought to bear on the Bureau of Mines to induce it to call a conference on the proper methods of drilling and casing gas and oil wells in coal fields and on the legislation needed for the regulation of the same. The author here suggests tentatively the discontinuance of the practice of leaving pillars around wells, and the protection of boreholes by other means. He questions whether a return of the measures to their original condition is not sufficient when wells are abandoned. His scheme for protecting wells through goares is submitted to the consideration of the public.

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The problems of gas or oil wells extending through or near coal mines, and through the future coal reserves, has gradually become more and more serious, not only on account of the danger to the miner, but also because there has been an increasing loss of coal in pillars left around the wells. There will be a further loss in the future unless means are found which, while giving safety to the miner, will enable the coal to be extracted.

DRILLING HAS MADE PROPERTY OF DOUBTFUL VALUE

A prominent engineer told the writer recently that he had been obliged to report unfavorably to his client upon the purchase of a certain tract of coal land which he was examining, on account of the numerous oil and gas wells on the property, which would seriously interfere with mining operations.

Fortunately so far there has not been a large loss of life in mines through explosions or fires caused by leakages of gas from wells, but there are a number of cases on record in which lives have been lost, and the possibility of occurrence of disasters has been present in a number of instances.

One special case, which has been much referred to, is that of the Middleton and Enterprise mines, near Fairmont, W. Va., where natural gas under high pressure leaked from a well and entered the two adjoining mines, leading to local explosions in each mine, and to the death of three miners. Fortunately the entrance of gas into the mine occurred at night when but few men were in the workings; and fortunately also, the company which owned the mines had taken most excellent precautions to keep the coaldust wet, and the explosions were thus limited in extent.

This case is particularly interesting because the well was surrounded by a pillar 100 ft. wide, and there was also a coal barrier between the two mines 100 ft. thick. Therefore the gas entered the mines, not through the coal, but through the floor and along a line 2300 ft. in length, according to Mr. Tarleton, general superintendent of the company, who presented a paper on the subject, which appeared in the *Transactions* of the West Virginia Mining Institute for 1911.

MINE FIRES FROM GAS WELLS

Wells are constantly being drilled in the coal fields of this country, and are numerous in the coal basins of

*Mining engineer, Bureau of Mines.

Note.—A paper delivered before the conference to suggest legislation covering the drilling of gas and oil wells in coal fields, Feb. 7, 1913.

Pennsylvania, West Virginia, Ohio, Indiana, Illinois and Kansas. In Pennsylvania and West Virginia, mines not infrequently strike uncharted and abandoned wells.

In many cases these have been found filled with gas, and in some instances the gas has been lighted. Recently a serious fire was caused in a mine in the vicinity of Pittsburgh, by gas which ignited when an unknown well was struck in mining operations.

Fortunately this fire was not attended by an explosion, but it led to the mine being shut down for two weeks, and the bureau's engineers and rescue crew had to be called upon to investigate behind the fire stoppings. In a number of cases where wells have been encountered, explosions have been but narrowly escaped.

It would therefore appear that the industry hitherto has been more lucky than far-seeing, in not taking precautions to make secure and to record the location of abandoned holes, which, while not giving gas in commercial quantities, make sufficient to render them serious menaces to mining.

THE NEED FOR SATISFACTORY LEGISLATION

The dangers which threaten have frequently been pointed out by I. C. White, of West Virginia, president of the Association of State Geologists. In a recent meeting of this association, a committee was appointed to confer with the director of the Bureau of Mines on this subject. Director Holmes also received requests from others to take up the question with a view to formulating suggestions which might lead to uniformity of oil- and gas-well legislation in the various states in which gas or oil is found in the coal fields.

Hitherto the legislation on gas and oil wells in all states except Ohio and Indiana, has dealt with the subject only from the standpoint of protecting the wells from one another. The Ohio laws, and to a lesser extent the Indiana laws, take some cognizance of the dangers to mining in the vicinity, but they are considered inadequate.

THE PRELIMINARY CONFERENCES

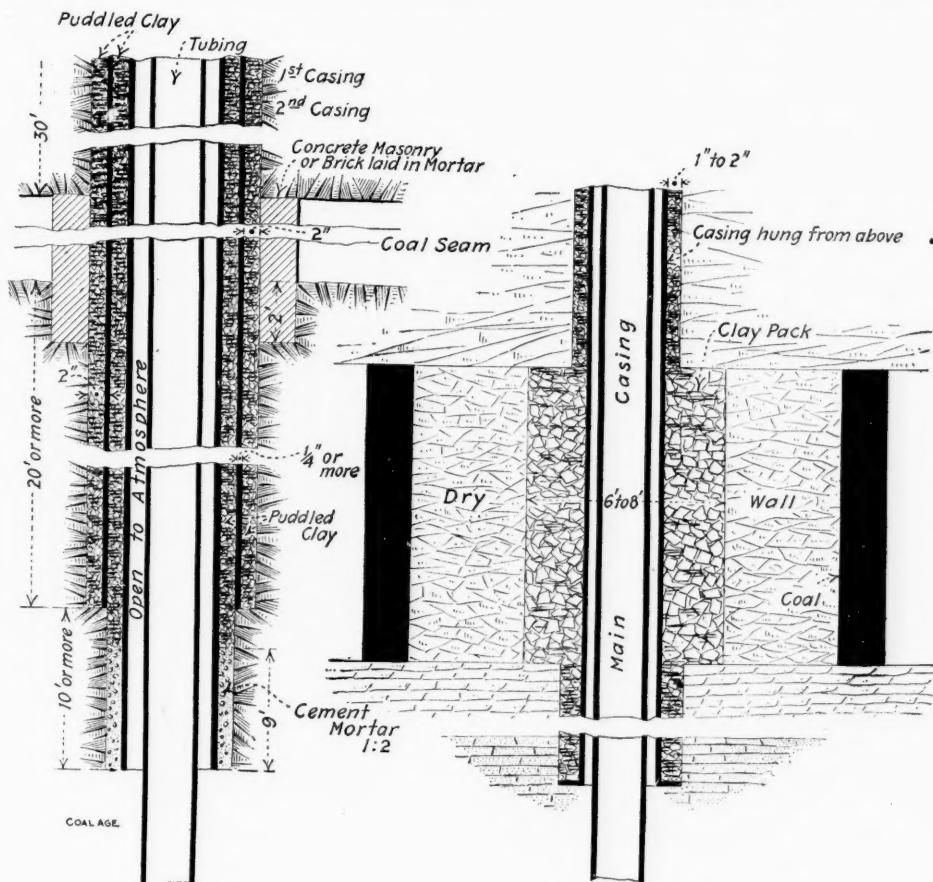
As a preliminary to this general meeting, it was thought advisable to have conferences with those interested in the questions involved; consequently a meeting was held a few weeks ago with some of the coal operators who had had experience in dealing with gas and oil wells through mines. Then followed a conference with representatives of the gas-well interests; and more recently the problem was discussed with a number of state geologists, representing several of the leading coal-mining states in which gas and oil wells have become or are becoming an important factor.

Following these preliminary meetings, the members of the staff of the Bureau of Mines who had been charged by the director with this investigation prepared a tentative outline of rules and regulations which might serve as a basis for possible legislation on the subject of oil and gas wells, passing through coal measures.

These were formulated to harmonize as far as possible with the ideas presented in the several preliminary conferences with the different interests, taking into consideration that it would be wise to have such rules and regu-

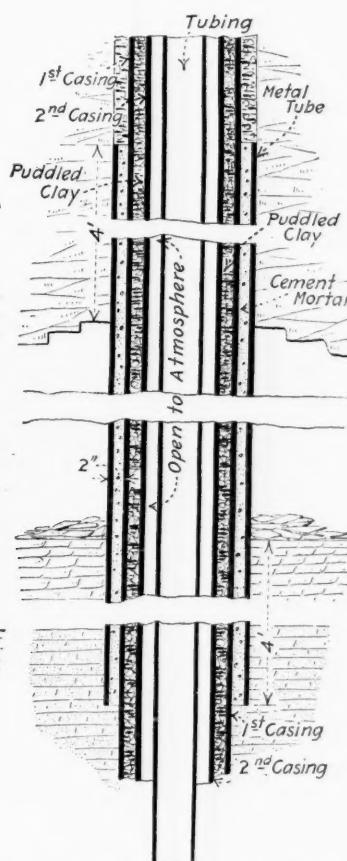
lations of a general character suitable for forming a basis for possible legislation in each of the states.

There are several features which have been discussed at considerable length in the preliminary conferences which have not been incorporated in the rules and regulations, as it was felt that it would not be wise to do so. The Bureau thought that certain questions should be left for gradual development, and in certain cases, should be left to private agreement between the parties at interest. These questions are as follows:



SUGGESTED METHOD OF CASING WELL THROUGH ACCESSIBLE COAL SEAM. HOOD AND HAGGEM PLAN

SUGGESTED METHOD OF CASING WELL WHERE PILLAR IS WITHDRAWN AS DESCRIBED ON PAGES 294 AND 295



SUGGESTED PLAN OF CASING WELL THROUGH INACCESSIBLE COAL SEAM. HOOD AND HAGGEM METHOD

SIZE OF COAL PILLARS THAT SHOULD SURROUND GAS AND OIL WELLS

It has been found from investigations and inquiry that the pillars which have been left around gas wells in Pennsylvania and West Virginia vary from 40 ft. diameter or 40 ft. square, to 200 ft. in diameter or 200 ft. square, the well being at the center of the circle or square. Inquiry has been made as to the underlying reasons by which the size of these pillars was determined, but it was found that the choice of size did not have a scientific basis. The various sizes of pillars merely represented the opinions of the parties concerned, or compromises made between interested parties. The courts in rendering decisions, would appear to have determined arbitrarily the size of pillars which must be left in certain cases. Presumably the size determined in each specific case represented the consensus of the testimony presented.

size of pillar surrounding the well is a problem similar to that which has arisen as to the proper size of pillar to be left surrounding a mine shaft. Investigation by the bureau has not disclosed any uniform system of determining the size of a shaft pillar, but there have been a number of empiric formulas used by mining engineers in the various mining countries. They are usually based on the distance of the coal bed from the surface.

The ratio in diameter of the pillar to depth from the surface in such formulas varied from $\frac{1}{4}$ to 1 up to $\frac{1}{2}$ to 1, that is, under the first ratio if the coal is 400 ft. below the surface, the pillar would be 100 ft.; in the latter ratio, the pillar diameter would be 200 feet.

EMPIRIC FORMULAS FOR BARRIER AND SHAFT PILLARS

A formula used for barrier pillars in the anthracite district, by a number of prominent companies, and approved by one of the state mine inspectors, takes into ac-

PILLAR IS NOT A STOPPING BUT A SUPPORT

In the preliminary conferences it was unanimously conceded that pillars of coal of any reasonable size did not prevent leakage of gas into the mine when there were defects in the well casings, but that they served as supports to the overlying strata to prevent fracturing or breakage of the well casing anywhere from the coal seam upward to the surface.

Looking at it from this point of view, the question of

count the thickness of the coal. The formula is as follows:

The width of the barrier pillar is equal to the thickness of workings multiplied by 1 per cent. of the depth below natural drainage level, plus the thickness of the workings $\times 5$.

If, for example, a seam was 9 ft. thick and 300 ft. below drainage level, the thickness of the barrier pillar would be $(9 \times 3) + (9 \times 5) = 72$ ft. The drainage level presumably is at or near the surface. While apparently this formula is chiefly for protection against inrushes of water, it is manifest that the effect of crushing is also involved, for if the pillar was crushed it would not furnish the necessary protection.

The Coal and Metal Miners' pocketbook offers this formula for shaft pillars deeper than 700 ft., namely, radius of shaft pillars equals $3 \times \sqrt{D \times t}$, where D equals depth of shaft and t equals thickness of seam. For example, in a shaft 900 ft. deep and the coal bed 8 ft. thick, the radius of pillar figures 255 ft., or diameter 510 feet.

The necessity for protecting a shaft is doubtless greater than for a gas or oil well. It is the means of egress, and it is not simply the protection of the shaft itself that must be considered, but also the support of the surrounding buildings, including the engine and boiler plant; hence there is greater need to have large pillars surrounding shafts than around wells.

THE FRACTURE MAY PASS OVER THE PILLAR

It is manifest that the varying character of the strata in different districts affects the determination of the size of mine pillars to adopt for oil or gas wells—that is, assuming that it is necessary to prevent any movement of the measures surrounding the casing all the way to the surface. If the roof over the coal bed breaks easily, the fracture will probably extend upward in more or less vertical planes; on the other hand, where the roof is strong, sandstone or limestone, and the fall occurs on only one side of the well first, which is usually the case, there is a possibility that there may be a considerable pull toward that side which may carry the break diagonally upward, so that the plane of fracture may intersect the line of the well before it reaches the surface, in which case there might be danger of rupturing the casing, or at least swinging it out of line.

INEQUALITY OF STRENGTH OF PILLAR

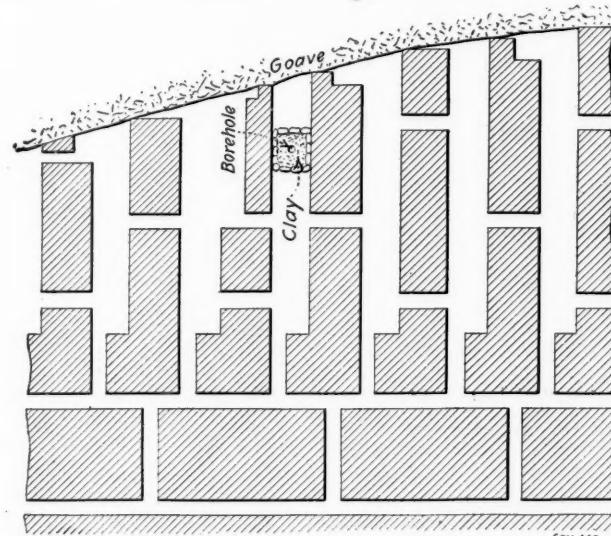
It was pointed out by S. A. Taylor in the first preliminary conferences, that where the cleavage of the coal was very marked, as in the Pittsburgh coal seam, a pillar should not be square but should be rectangular in order to get equal strength, that is, that the pillar should be longer across the faces, or parallel with the butts.

The Consolidation Coal Co., in the Fairmont district, is considering the necessity of leaving pillars 200 ft. square, surrounding the wells. It is easy, however, to realize how serious this requirement may be when the wells are close together, either from the standpoint of laying out the mine, or from the loss of coal in the pillars. This brings up the question whether or not it is necessary to retain the pillar permanently.

EXTRACTION OF COAL SURROUNDING A WELL

I suggested in the preliminary conferences that it might be possible to dispense with a coal pillar around an oil or gas well provided an artificial pillar was substituted. This proposal is not quite so radical as it might seem at first. The coal surrounding shafts has been extracted without detriment in some of the longwall mines in Great Britain, and in one longwall mine in northern Illinois.

Where this plan has been employed, the section from which the coal has been excavated is carefully packed with broken rock and dirt, as is usually done in "longwall advancing," so that the movement downward is



PROPOSED METHOD OF PROTECTED WELL WHERE COAL IS ABOUT TO BE ENTIRELY WITHDRAWN

very gradual and even, the strata all the way to the surface subsiding equally, and without damage to the surface buildings, provided the longwall face advances regularly. The final surface subsidence where the goave has been well filled with dry packing, is about 50 per cent. of the thickness of the excavation; that is, in a bed of coal 6 ft. thick the subsidence would be about 3 feet.

A METHOD SUGGESTED WHERE NO PILLARS ARE LEFT

To suit the room-and-pillar conditions, I suggest the following plan: That a room be laid out so that the drillhole will be approximately in the center of same; in drilling the well, the hole to be made 2 or 3 in. larger in diameter than the outer casing which is to be inserted, so that there is a space of from 1 to 2 in. surrounding that pipe.

Let us suppose this outer casing is to go 30 ft. below the coal bed, then the larger hole will be drilled an additional distance equal to the thickness of the seam, below where the shoe of the casing is to hang. The casing will then be lowered and hung from cross-beam supports at the surface, the ends of which are to be placed on piers so as to make these supports permanent.

These cross-beams should be steel channels or girders, 9 to 10 ft. or more in length, and of sufficient strength to hold the weight of the casing. Before lowering this pipe a gasket of rubber or canvas is to be fastened just above the shoe around the outside, so as to fit against the

rock or shale when the casing has been lowered to place and hung from the beam supports.

A grouting of clay will be run in between the casing and the sides of hole so as to completely fill the space from the gasket to the surface. This is to allow an opportunity for the casing to slide freely, either at the bottom or the top if the coal is excavated and the ground subsides.

After the casing has been put in and grouted with clay, the drilling and putting down of the inner casing will proceed in the usual manner. If subsidence of the ground occurs the arrangements spoken of will be equivalent to an expansion joint in a steam line. The inner casings and the gas tube being rigid and fixed below, when the subsidence takes place they will merely project that much further above the surface of the ground, and will not be affected by the subsidence.

It is, of course, assumed that a space will always be left open to the top between the outer casing and the next inner casing, so that if there are any gas leaks they will be enabled to pass unobstructed to the surface, in accordance with the plan employed in recent wells whereby agreement with the coal companies various precautions have been taken.

PRECAUTIONS WHEN THE WELL IS REACHED

When the room above mentioned has reached the well, the casing should be protected from contact with moving cars and from the violence of blasts by the use of the necessary post timber; and further, if the roof is very poor, a timber cog should be carefully built around the well and packed tightly with clay. When the rooms in the vicinity have reached their proper distance, before withdrawing the pillars, clay should be brought from the surface (any ordinary clay will do) placed around the well casing, and tightly packed so as to make a cylinder from 6 to 8 ft. in diameter. It will not be necessary to withdraw any of the timber to do this.

The space surrounding this clay cylinder back to the ribs should be filled with mine waste obtained from lifting the bottom, or from fallen roof rock. When the ribs have been drawn back to a point opposite the artificial pillars, a thin curtain wall can be retained on either rib, merely to hold the gob in place.

The purpose of the "gobbing" will be to allow the roof to be dropped evenly, as the packed clay around the hole will prevent undue pressure at any point, thus preventing distortion of the casing. Since above and below the coal bed the casing is surrounded with a layer of clay, it will either allow the roof to slip down without injury to the casing, or if the whole strata above goes down and grips the casing, the latter will slide further down into the hole, which has been previously drilled large enough to receive it.

With such a plan properly carried out, I can see no serious risk in not leaving a coal pillar, for even if a break of the outer casing occurred, which does not seem likely, at all times there is a vent to the surface between the inner and outer casing.

If abandoned wells are properly plugged from bottom to top, there would seem to be no need for other special precautions for deeper coal beds. It is manifest that in the great majority of cases these coal beds will not be worked for many years to come, perhaps 25 or 50, or as much as 100 years. It is also clear that no casing

would resist corrosion for such extended periods, therefore it is believed that the project of restoring the strata to practically the same strength and impermeability as originally found will be the best method.

ABANDONED WELLS SHOULD BE PLUGGED TO THE SURFACE

It was further agreed by the geologists that the simplest and safest way of handling abandoned wells through coal mines will be to plug them tightly all the way from the bottom to the surface. If holes are plugged so that there is no leakage of gas, there would seem to be no danger in laying out a mine, or in the working of same, without paying attention to an abandoned well, beyond approaching it carefully, and testing to see whether there is any sign of leakage of gas.

DRILLING GAS WELLS THROUGH INACCESSIBLE MINE WORKINGS

The question has arisen in several cases as to the protection from leakage of a gas well drilled through an inaccessible mine opening or excavation, as, for example, where pillars have been pulled. In the case of such leakage there would be danger of the goave filling with gas, which would escape into the active mine workings.

I will not attempt to discuss the relative merits of the two sides to the controversy, but as the courts have held that the parties possessing the gas ownership have the right to drill, it is necessary to consider how this can be done with a minimum amount of danger.

All have conceded the necessity of having at least one outer protective casing open at the top to the atmosphere, but in the event that acid mine water may corrode it, additional protection is necessary. One plan proposed by Mr. McCloy, of the Philadelphia Company, is to make the hole large enough to insert an outer pipe opposite the coal bed and fill between it and the casing with cement. This plan seems to be an excellent one.

THE PROTECTIVE CONE IN ABANDONED WORKINGS

I offer an alternative scheme which might be used when the mine excavation is not too much filled with débris, and in some cases might be used to supplement the previously described method. The plan is: When the drill has entered the excavated space and drilled through any loose rock to the bottom, to fill the space with crushed rock or gravel, sand and cement, thoroughly mixed by a concrete mixer.

This is to be put in rapidly and will, if of proper consistency, form a conical heap with the apex at the top of the open space. A conical bit or tool fixed on the end of the string of tools will then be immediately lowered and used to spread out the top of the cone. More concrete must then be put in and again spread out by the conical tool.

The concrete should then be allowed to set, following which a hole will be drilled through it by the usual method. This hole may be a small one. Then liquid cement will be run in and forced under pressure to fill the interstices.

After this has set it is anticipated that there will be a strong concrete column through the mine excavation, which will be practically impervious to the mine water, and through which a hole of full size can be drilled as through a solid rock stratum, the casings being inserted in the usual manner.

The Gas and Oil Well Problem

BY R. DAWSON HALL

SYNOPSIS—Some reasons for urging the elastic casing as a necessity were presented at the recent conference on gas and oil wells passing through coal. A committee was formed to discuss the proposed legislation. It has been decided to proceed in a more leisurely and cautious manner in framing a code than was at first suggested.



In this article, I purpose to continue the remarks on the Pittsburgh fuel-well conference contained in the previous issue.

It was urged at the meeting that the recommendations of the Bureau did not furnish a sufficient guarantee of elasticity, though it must be granted that the provision for this quality has rarely if ever been even considered in previous discussions. It was pointed out that the space between casings was only two inches on either side, and even this was much reduced at couplings.

Some sketches here reproduced were presented to the meeting to aid in the presentation of this view of the subject. Fig. 1 shows a rock beam over an excavation. The roof in bending tends to break at A, B and C. A and

must be 6 ft. in order that a body of rock which originally was rectangular may become a rhomboid.

It must be remembered, however, that if this slipping along bedding planes were uniform from coal to surface there would be little or no injury to a bore hole drilled through any part of the measures. The strain would arise wholly from actions prior to the shearing, which are in themselves severe enough. There is good reason to believe, however, that most of the readjustment takes place at favoring bedding planes, which are rendered free to slide past one another by reason of the new-found freedom caused by ruptures from tension.

HOW SHEARS ARE EASED IN PRACTICE

O. P. Hood, the mechanical engineer of the Bureau, in reply, declared that there was rarely any such thing in actual practice as the shearing of pipe or iron by natural forces, that shearing could hardly be attained in a laboratory or a mill and that what actually took place was a reverse bending with curves of small radius.

This criticism is perfectly just and might be supple-

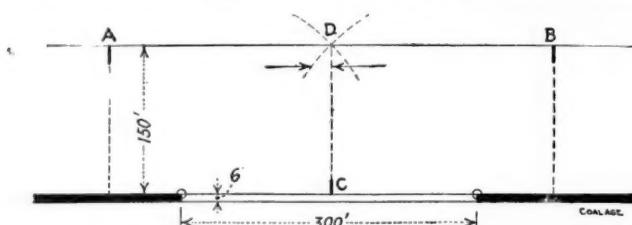


FIG. 1. ROOF WHICH HAS FAILED BY BENDING BEGINS TO RESIST BY ARCHING

B are points on the surface over the pillars, and C is the center point on the underside of the roof beam.

These breaks do not extend, at least at once, for the full depth or height of the rock mass, and it may be added that it is not asserted that the breaks over the pillars are vertical; there are some reasons for thinking they are not. For the present purpose, the matter is not material.

HOW ROOF WILL WARP

These breaks tend to divide the roof which we have in question into disturbed and unaffected areas. The latter shows in sectional elevation as a pair of rectangles. These rectangles tend to revolve on the edges of the coal pillars, which are here supposed to be completely resistant. This action produces a thrust between the rectangles at D, see Fig. 1. The bending is thus arrested until some part of the roof mass gives.

One action which may take place and the most probable of all, is a horizontal shear along one of the many weak measures, or less probably between two bodies of rock having a smooth bed between them. If the coal is 6 ft. thick and the opening is 300 ft., the final slope of the strata in case of complete subsidence and a complete break, will be 6 ft. in 150 ft. If the measures are 150 ft. thick, the aggregate of shear along the shearing planes

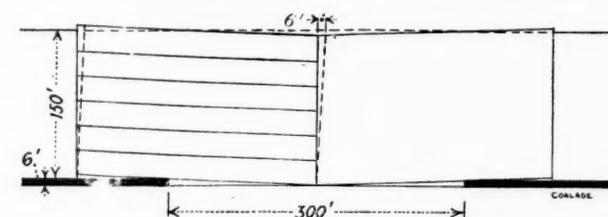


FIG. 2. ROOF IN PREVIOUS FIGURE BREAKS DOWN COMPLETELY AS THE MEASURES SLIDE PAST EACH OTHER

ment by the statement that the principal shearing distortions would occur at beds of coal, clay and shale, and would be distributed over some distance. Still making all allowances, the fact that measures readjust their shape as much as 6 or more feet is extremely suggestive of deformations.

Of course, the angle of warp is further reduced when the floor rises, the coal crushes and gob is left in the mine. On the other hand there is an increase of movement when the coal is thicker and the roof beam of greater depth and is in proportion, other things being equal to these factors.

THE ACTION OF UNBROKEN ROOF

It was pointed out also how extreme might be the motion of a borehole before breakage took place. If a lath is placed over two supports and the position marked by two tacks A and B, as in Fig. 3, on being loaded it is drawn down between the supports and the tacks moved to A' and B'. A similar action takes place in a modified degree with the mine roof and the new angle assumed by A and B, to wit, A' and B' shows the nature of the tilt which a vertical hole might receive.

At the same time a tack in mid span is lowered vertically and is still plumb, regardless of the amount of lowering. This is why a borehole in the location shown in Fig. 4 would be subject to minimum distortion.

It was suggested that the hole should be lined with a

thin coating of cement of an internal diameter 8 in. larger than that of the casing. This cement could be kept in place by some extremely light pipe, possibly spiral riveted. The space between this pipe and the interior casing could be filled with clay.

THE DIFFICULTIES IN ABANDONMENT

R. C. Johnson spoke on the possibilities of cement grouting under pressure for the filling of crevices in broken rock. The use of cement in this connection is described in Vol. 1, pp. 639 and 674, and the German system can be found in the *Engineering and Mining Journal*, Vol. 95, p. 363. There is little question but what such grouting would serve on abandonment of wells to stop natural crevices and those caused by the shooting of the hole, but it may be added that the pressures in a well 3000 ft. deep are even greater than Mr. Johnson has ever employed. The whole objection is to the cost of such work and that might not be prohibitive.

The difficulties involved in the abandoning of fuel wells caused some of the coal operators to favor the insertion of a 2-in. line extending 10 ft. above the surface and bent over with elbows. It is easy to see that the perpetual use of an unprotected vent pipe as part of an abandoned well is fraught with much danger and could only be

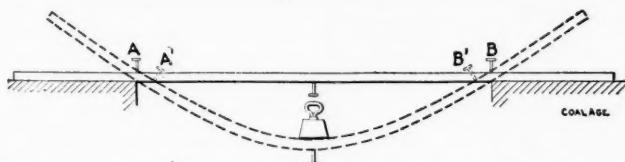


FIG. 3. TACKS MOVE BETWEEN SUPPORTS AND TILT OUT OF PLUMB WHEN LATH SAGS

justified where efficient plugging was impossible or where the measures above the fuel sands were so creviced as to make the escape of gas dangerous.

THE WORKABLE SEAM

Mr. DeWolf frequently brought up the question as to what coal seams should be protected. He urged that drillers could not well form an estimate of the thickness of the coal beds through which they passed and would be less likely to find workable beds if the protection of such as they found would be likely to involve the expenditure of much money.

He thought the drillers should be compelled to protect, by double casings, all the productive coal measures whether coal was known to be contained in them or not. It was easy to see that the definition of "workable seams" had a larger meaning in Mr. DeWolf's vocabulary than in that of the Bureau. The engineers of that body declared a "workable seam" to be one likely to be exploited during the life of the well.

All other seams were to be protected by the precautions in abandonment. This seems a fair decision. Extremely remote protection afforded at great expense is not true conservation but waste. If beds are to be protected for long periods of time before mining has commenced concrete casing seems to be preferable wherever the oil can be prevented from attacking it.

Where the concrete is thick, it is probable that there is a limit to the corrosion, the face of the mass becoming glassy and impervious. But unless the quantity of material is large and dense, this action will not prevent cor-

rosion. Moreover concrete is destroyed by oil and if any length of cement-protected casing is attacked by oil and salt water in turn, the casing will be inevitably destroyed.

THE DIFFICULTY IN PLACING THE CLAY

Opposed to these disadvantages, clay seems to be free from corrosion by salt water or oil. If deposited as a slime it would contain few air bubbles. Mr. Hice, however, doubted whether, if clay were comminuted so as to form a slime, it would settle at all in a coherent manner in a hole where the water is not filtered off.

Mr. Hood and Mr. Heggem urged that it would so settle if the water were made acid and instanced filling pipes with the loess of Louisiana, but while it is possible that the salt in the wells would be enough to cause the

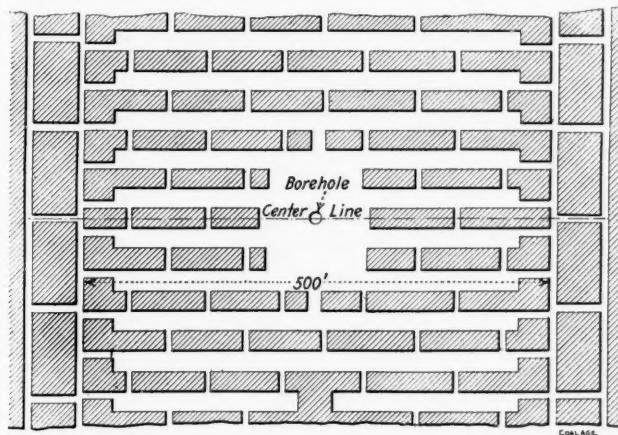


FIG. 4. THE ONLY LOCATION FOR A FUEL WELL WHERE COAL PILLAR MAY BE WITHDRAWN WITHOUT DISTORTION

deposition of a cloud-like flocculence, the most acid of waters would be unlikely to produce the equivalent of a puddled clay. As Mr. Rice observed, it would coat the casings but not fill the spaces between them.

The keynote of the meeting was haste. It was represented that legislation should be secured before the legislatures ceased their sessions. It came as a surprise when H. M. Wilson, engineer in charge of the Bureau of Mines, stated that there was no hurry and that a committee meeting in March would meet the situation. It is too late to formulate or pass a well-considered measure. Possibly a bill regulating the surveying of wells could and should be immediately passed but the other matters have been so little discussed, and are understood in their entirety by so few that hurry is undesirable.

It might be added that on Thursday, Feb. 13, the committeemen named by the chair met and appointed a few of the final committee, the selection of the remainder being left for the individual committeemen, acting through and for organizations representing coal, oil and gas interests.

The coal committeeman was G. W. Schluerderberg; the representative of the bureau, G. S. Rice; Frank DeWolf is committeeman for the state geologists; J. B. Corrin and E. E. Crocker will represent the gas and oil interests, and David Young, the mine inspectors.

The next meeting was arranged for March, and is to be held in Pittsburgh. The presiding officer, W. E. Fohl and the secretary, O. P. Hood, are to be ex-officio members.

The Soft Coals of the Bering Field

BY W. R. CRANE*

SYNOPSIS—The coals of the Kushtaka and Carbon ridges are thicker in aggregate than the anthracite coals to the east and may reach in all 188 ft., four beds ranging from 25 to 32 ft. Proceeding further to the east, a reduction in aggregate thickness is discovered, the Bering Lake district having 76 ft. and the Lake Tokun body only 30 ft. In some cases the coal is so fragmentary as to appear briquetted in the bed, and this condition extends into the body of the hill. But little of all the Bering River field will find its way into market in its natural condition. Coking or briquetting will be necessary before it is sold. The second of a series of articles by W. R. Crane.

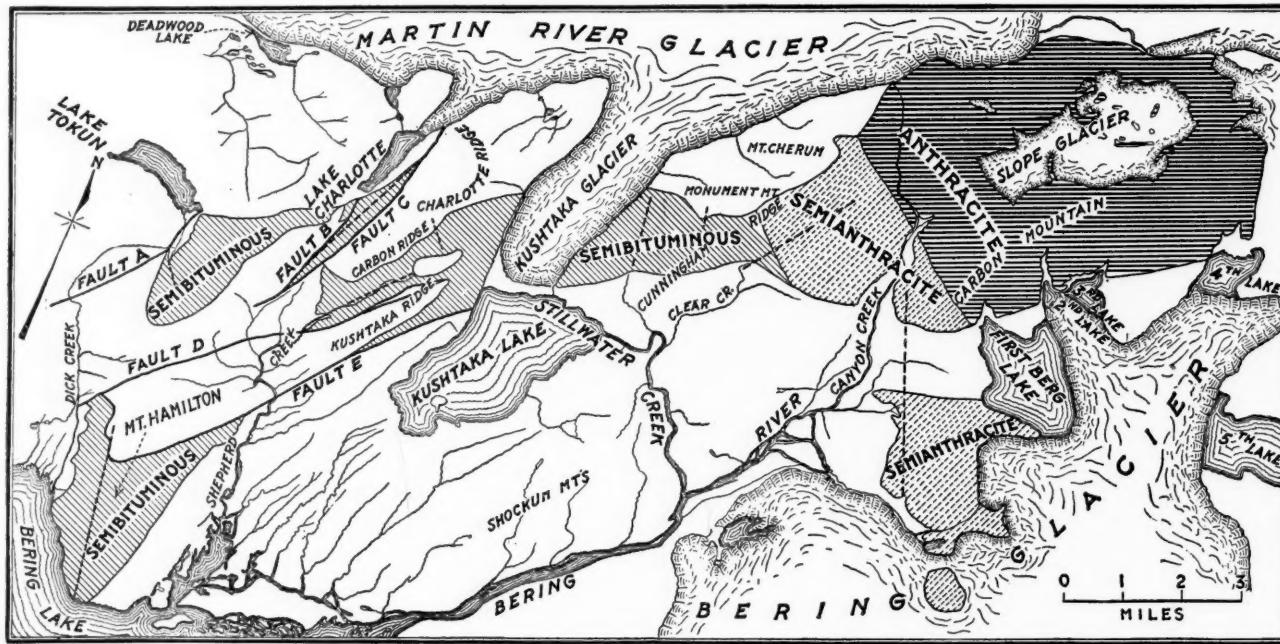
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The district named after the Kushtaka and Carbon ridges lies wholly within the semibituminous coal area.

these beds is such as to place them parallel with those on the eastern slope of the ridge. The thickness of these beds is as follows: 17 ft., 13 ft. 6 in., 8 ft., 20 ft., and 19 ft. 6 in., making an aggregate of over 70 ft., which if added to the total thickness of beds on the eastern slope of the ridges make a total thickness of over 150 ft. of workable coal.

WESTERN HALF HAS 188 FT. OF SEMIBITUMINOUS COAL

There are abundant outcrops of excellent coal on the western slope of Kushtaka ridge and the southern extension of Carbon ridge, but owing to the distance between them and the extreme folding and faulting that they have undergone, it is hazardous to attempt to correlate with any degree of accuracy and equally difficult to estimate the number and thickness of the separate beds. A state-



THE BERING RIVER COAL FIELD IN ALASKA, SHOWING THE CHANGE IN THE NATURE OF THE COAL BEDS FROM NORTHEAST TO SOUTHWEST

The outcrops of the coal beds occur along the streams separating the two ridges, on the slopes of the latter, and to a limited extent on the tops of the ridges themselves.

EASTERN HALF HAS 150 FT. OF SEMIBITUMINOUS COAL

A large number of coal beds of moderate size have been located on the eastern slopes of the Kushtaka and Carbon ridges, but owing to the dense thickets of salmon brush, willows and alders, as well as a thick covering of moss, many of the outcrops are concealed. However, over 80 ft. of coal has been measured on the lake side or the eastern slopes of these ridges, and it is not improbable that many other workable beds still remain to be uncovered.

Five coal beds outcrop on the top of the extremely narrow prong of Carbon Ridge. The dip and strike of

ment as to the number and thickness of the various beds will, however, serve to give an idea of the size of the coal beds that have been located.

Beginning with the extreme southern extension of this district on Carbon Creek and proceeding northward, the following thickness of coal beds was noted: 18 in., 10 ft., 9 ft. 4 in., 30 ft., 32 ft., 24 ft., 30 ft., 12 ft. 6 in., 25 ft., 14 ft., and many others impossible to measure with any degree of accuracy owing to excessive folding. The aggregate thickness of the beds measured is 188 ft.

TWO LOCALITIES SO CRUMPLED THAT STRIP-PIT MINING WILL BE REQUIRED

There are two localities in this district, namely, west of the narrow ridge extending southeastward from Carbon ridge and west of the northernmost extension of Kushtaka ridge, where folding and faulting have caused such extreme changes in the coal beds as to render them

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totally unfit for working except by open cut, but fortunately such areas are very limited in extent.

The coal beds at these points have been forced back upon themselves by the close folding of the inclosing rocks until in many cases the rock strata have been crowded out and the coal massed together in huge pockets. Erosion has removed the overlying rocks and exposed large bodies of badly crushed coal. See the illustration below.

Another more or less isolated coal-bearing area, which may be considered as belonging to this district, lies on the western slope of Carbon ridge and also on the like slope of Charlotte ridge. This area lies between two extensive fault planes forming a long narrow strip of land practically separated from the adjoining districts except for narrow extensions of the Kushtaka and Carbon ridges touching it on the east and a similar extension of the Tokun district connecting with it on the west.

No attempt has been made to correlate the coal beds lying within this area, but the following outcrops have been located: 20 ft. 6 in. of coal at the extreme southern extension of the area and 16 ft. at a point about halfway up Lake Charlotte.

BERING LAKE DISTRICT

The Bering Lake district comprises an isolated area lying directly to the east of Bering Lake and including



SECTION ON WEST WALL OF CANON, CANYON CREEK,
SHOWING FOLDED STRATA

most of the highland between the lake and Shepard Creek. To the northward the district splits into two prongs, one extending toward Lake Tokun on the north, the other toward the Kushtaka and Carbon ridges district to the northeastward.

The coals of this district are wholly semibituminous and where not too badly broken are of fairly good grade. As the strike of the majority of the coal beds is east and west, a north and south line would serve very well along which to estimate their number and thickness. Beginning at Poul's Point and proceeding northward the following thickness of coal beds was noted: 9 ft., 7 ft. 6 in., 2 ft. 4 in., 6 ft. 10 in., 4 ft., 9 ft., 17 ft., 10 ft. 6 in., 7 ft., 3 ft. 6 in., etc., giving an aggregate thickness of over 76 feet.

TABLE GIVING THE CONSTITUENTS AND HEATING EFFECT OF BERING RIVER COALS

District	Average of Analysis						Volatile and Combustible Matter						Fixed Carbon						Ash						Calorific Value B.t.u.	
	A	S-A	S-B	A	S-A	S-B	A	S-A	S-B	A	S-A	S-B	A	S-A	S-B	A	S-A	S-B	A	S-A	S-B	A	S-A	S-B	S-A	S-B
Carbon Mountain .	7	8	...	7.88	5.34	...	6.15	8.29	...	78.23	75.48	...	7.74	18.37	...	1.30	0.86	...	12,576	...	(2)					
Cunningham Ridge .	4	4	...	5.59	3.62	...	7.13	15.54	...	78.85	74.80	...	6.16	6.53	...	1.43	1.30	...	13,667	13,952						
Kushtaka and Carbon Ridges.....	15	...	...	3.64	...	...	14.10	...	...	75.42	...	...	6.16	...	...	1.37	...	...	1.37	...	(3)				
Bering Lake.....	7	...	...	6.01	...	...	13.01	...	...	63.77	...	...	17.30	...	...	2.94	...	...	13,580	...					
Lake Tokun.....	1	...	...	4.35	...	...	11.97	...	...	73.34	...	...	10.34	...	...	1.13	...	...	11,153	...					

(1) Average of 6 tests. (2) Average of 4 tests. (3) Average of 4 tests.
A = anthracite. S-A = semi-anthracite. S-B = semi-bituminous.

POWERS AND FALLS CREEKS ARE NOT ONLY CONTORTED, BUT HAVE MANY SHALE PARTINGS

The coal beds on Falls Creek, in the northern extension of this district, have been badly folded and faulted, so much so that it is extremely difficult to secure reliable information regarding their thickness and extent. Further, the coals of both Powers and Falls Creeks tend to be dirty, containing numerous shale partings.

The coal beds on a narrow ridge, the southern extension of Mount Hamilton, stand at high inclinations; one in particular, the 17-ft. bed mentioned above and occurring at a considerable elevation, stands practically on end. This bed measures 17 ft. at the summit of the ridge, but pinches out in depth, as shown by the outcrops on the side of the mountain, until it narrows to 6 ft. some 300 ft. below.

The coal bed at the McDonald mine is somewhat irregular and is claimed to be a detached mass of the original bed. If this is the case the line of displacement should readily be seen, but I am not aware of its existence.

LAKE TOKUN DISTRICT

This area of semibituminous coal lies to the southeast of Lake Tokun, and on Tokun Creek. The locations of the outcrops of coal beds have been made principally along the gorge of the creek. The precipitous walls of the cañon of Tokun Creek afford an excellent opportunity to locate outcrops and while a number of fair-sized outcrops have been found, many others are so badly disturbed and broken by rock movements as to be practically worthless.

The following measurements were taken along the course of the creek, beginning with the uppermost and proceeding downward toward Lake Tokun: 8 ft. 10 in., 9 ft. 5 ft., 6 ft. 6 in., etc., making total thickness of approximately 30 feet.

POWDERED COAL SOMETIMES BRIQUETTED IN THE BED BY PRESSURE

The physical condition of the coals of the Bering River field is such as to render mining both difficult and wasteful. From one end of the field to the other extreme rock movements have broken the coal badly while in certain localities the coal has been crushed almost to powder, although it stands fairly well in the face at the outcrops owing to the high pressure to which it has been subjected.

There is little likelihood, as is often expressed, that the badly crushed condition of the coal is of a superficial nature only, and will disappear beyond the weathered zone. Sufficient work has been done in the nature of drifts and tunnels driven into the coal beds for distances up to 700 ft., to demonstrate that while the coal is not as soft as at the outcrops yet the fractured condition exists and practically the same degree of breakage is ex-

perienced in mining and handling as at a distance of only a few feet from the exposures on the surface.

THE CRUSHING OF THE COAL HAS LESSENED ITS VALUE

Obviously the anthracite coals will be affected to a much greater extent by breakage and disintegration than the bituminous coals, and their commercial value will be reduced in proportion to the sizes that can be delivered to the consumer. A certain reduction in size is advantageous but beyond that the result is an economic loss.

Sizes including pea coal and below are often of necessity, placed on the market in competition with bituminous coals for steaming purposes and at a cost below that of production.

With the bituminous and to a less extent with the semi-anthracite coals the reduction in size is of less importance although it is a serious matter even with these coals, particularly from the standpoint of waste in mining and handling. With coking coals, aside from waste and the cost of cleaning, if necessary, there is little disadvantage in a certain amount of breakage, as reduction must ultimately be resorted to.

Much work has been done by the United States Geological Survey in determining the constituents and heat value of the coals of the Bering River field. At the foot of the foregoing page, the analyses of coals taken from the various districts are listed in the order followed in this description.

The ash content of these coals is very high so that extra care will be required in mining and there may be much expense incurred in preparation. It is not improbable but that in certain localities it may be found necessary to leave several inches of coal on the bottom to prevent too extensive mixing of the coal with waste.

As a whole, the bituminous coals of the Bering River field cannot be used without being first converted into coke. Likewise the anthracite and semianthracite must, for the most part, be rendered acceptable to the market by briquetting.

♦

A Test of Carborite Bits

The old adage concerning the "the test of the pudding," is as applicable to coal mining as to anything else. Many devices are constantly being placed before the country which appear to possess good qualities. None of these, however, secure general adoption, unless they "make good" under actual conditions of service.

The Carborite Steel Bit Co., of St. Louis, Mo., has placed upon the market a new bit for use in chain coal-cutting machines, a test of which was recently made by R. Neeson, mine manager, O'Gara Coal Co. mine No. 4, at Harrisburg, Ill. The results obtained are here given:

Two machines were selected in as nearly the same physical condition as possible. One of these was supplied with ordinary bits, while in the other Carborite cutters were placed. These machines were then operated for 13 days in adjacent territory, so as to subject them to cutting conditions as nearly identical as possible, the bits in both machines being sharpened only when necessary. Records were kept of the voltage and amperage of the current and of the tonnage produced by each machine.

The Carborite bits operated 13 days with 12 sharpenings, producing 3546 tons of coal, or slightly less than 273

tons per sharpening. The average voltage was 250, while the amperage ran from 35 to 45. The machine worked free at all times and without any breakdowns.

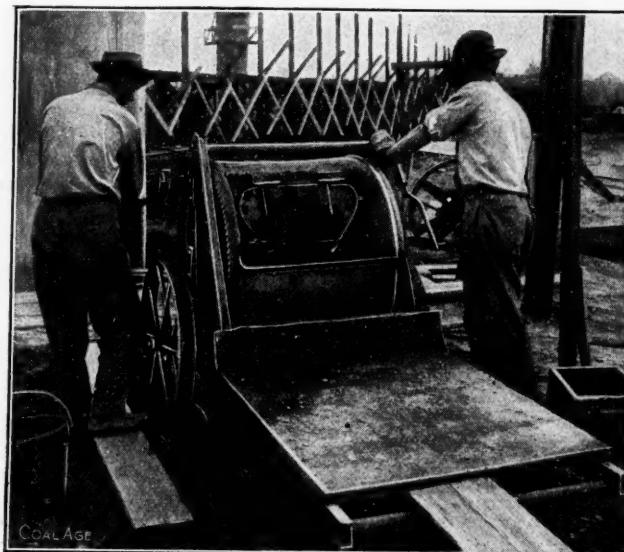
The ordinary or standard bits tested against these, operated the 13 days with 36 sharpenings, producing 3120 tons of coal, or approximately 84½ tons per sharpening. The voltage recorded was 250, the same as before, but the amperage ran from 65 to 75. During the time of testing, this machine also suffered four breakdowns—three chain failures and one burn-out.

It is to be regretted that the test was not carried a step further, and the two types of bits exchanged between the two machines and the work continued for another equal period of time. Had the records then been as much in favor of the new bit as before, it would have removed all suspicion that the results might, in part at least, have been due to the condition of the machine rather than the excellence of the cutters.

♦

A Hand Mixer for Concreting

Supplementing the series of articles now appearing in COAL AGE on colliery concreting, we show in the accompanying illustration an ingenious hand mixer. This machine is comparatively inexpensive and of such size that it could be readily mounted on mine-car trucks and run through any part of the mine.



VIEW OF SMALL CONCRETE HAND MIXER

It is a well known fact that ordinary hand mixing is not only exorbitant in cost but also uncertain in results. For the small jobs that are almost incessantly developing around the surface plant or in the mine itself, few companies feel justified in going to the expense of a complicated power-driven mixing machine, and such would also be cumbersome to handle under certain conditions.

The machine shown herewith turns slowly and easily, weighs only 1000 lb., and, as before mentioned, is self-contained so that it could be readily taken down the slope or shaft without dismounting. The manufacturers, T. L. Smith & Co., Milwaukee, Wis., claim that only three turns are required for a perfect mixture, the capacity of each batch is 2½ cu.ft., and the daily capacity of the machine, 25 to 30 cubic yards.

Central Washer of the Ala. F. & I. Co.—II

BY EDW. H. COXE*

SYNOPSIS—The second and concluding installment on this subject, in which a description of the mines and methods of working are given. Considerable water is encountered and a comparatively large drainage equipment is in use.

♦♦

The main washer building, in the early stages of construction, is shown in Fig. 1, and the washed-coal bins in Fig. 3.

The separation in washing is made on a 1.37 specific gravity. The average analysis of the Margaret raw coal as brought to the washer shows 25 per cent. ash, which

trician, engineer, etc., is thirty. These are housed in thirteen 4-room and one 6-room house, weather boarded and ceiled, with 16-ft. square rooms. The houses are fenced and each one has ample ground surrounding it for a good garden.

THE ACMAR MINE

As stated before, this mine is on the Mammoth seam and it has an average daily output of 1800 tons. The slate roof is about 30 ft. thick and is one of the best mine roofs I have ever seen.

The upper bench, which separates readily from both

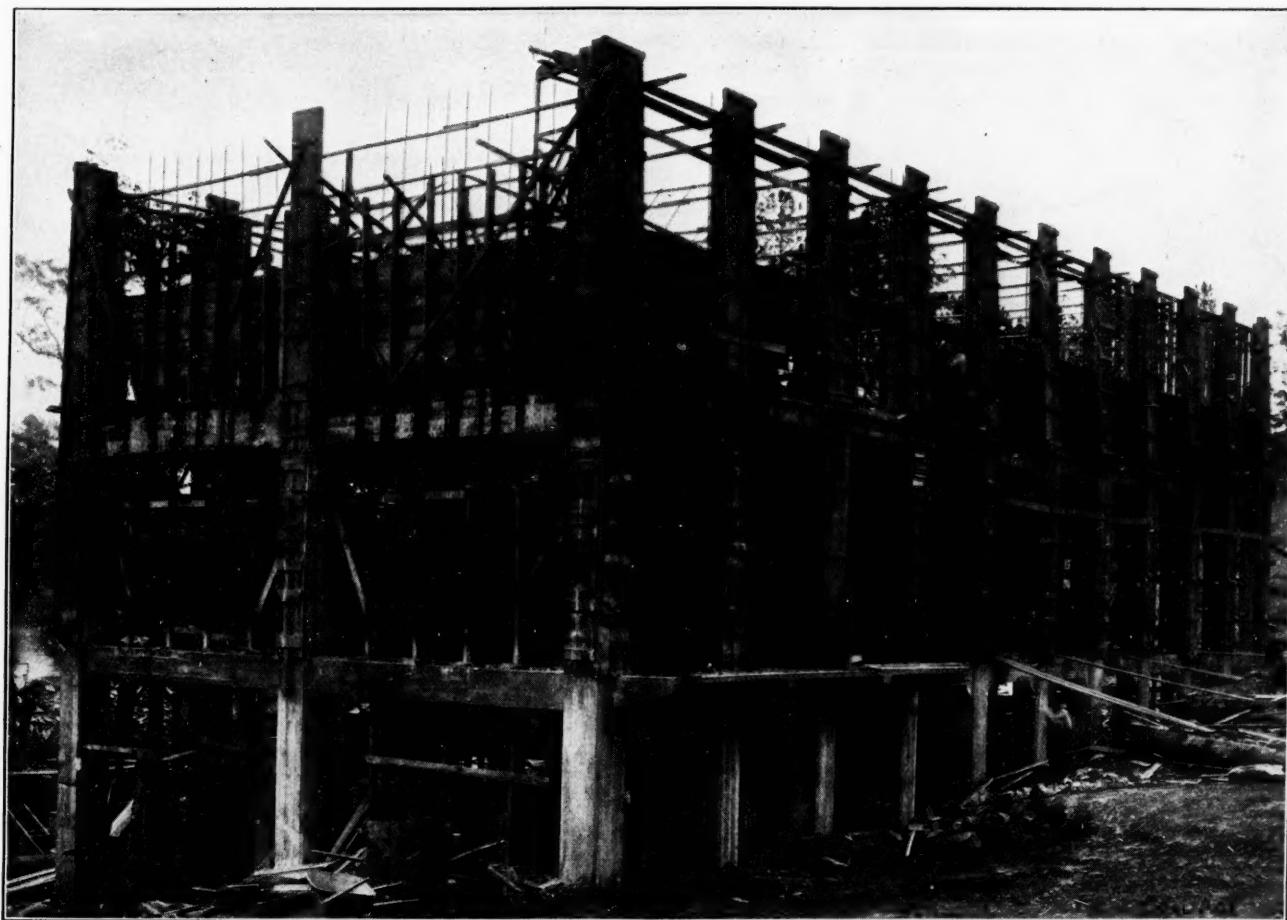


FIG. 1. THE MAIN WASHER BUILDING OF THE ALABAMA FUEL & IRON CO., IN PROCESS OF CONSTRUCTION

is reduced by washing to 7 per cent., as compared with 13 and 10½ per cent. for the Aemar coal. The washed coal contains 3 per cent. of sink heavier than 1.37 sp.gr., the balance of the ash being in chemical combination with the coal.

There is, in connection with the washer, a small machine shop, equipped with a lathe having a 24-in. swing, a sharpener, drill press and forge. In this shop all the light repair work for all the mines, as well as the washer, is done, that can be handled. The total number of men employed at this washer, including superintendent, elec-

the rash parting and the roof, is shot out on the solid by shearing ahead of the cutting shots, advancing about 12 ft.; then the parting, which is soft, is shoveled off into the gob, and the bottom bench of coal is shot up. Monobel, manufactured by the du Pont Co., is used exclusively for blasting. The mine was opened on the outerop, the slope following the seam at right angles to the strike; the pitch at the outerop is about 29 per cent., which decreases gradually, till near the face it is only a trifle over 4 per cent.

Near the face of the slope is a fault. This is not a regular displacement, but is in the nature of a wave or wrinkle, the coal rising abruptly about 6 ft., without de-

*1026 Glen Iris Ave., Birmingham, Ala.

creasing in thickness; then rising gradually for about 80 ft., and at the present face indications are that it will again assume the slight normal dip. The headings are driven on a slight up-grade to be self-draining. On the right of the slope the pitch steepens, causing the headings to come closer together, and on the left the reverse obtains. Every eighth room an 80-ft. solid block of coal is left in.

MINE IS VENTILATED BY A SIROCCO FAN

The mine is ventilated by a 6x3-ft. single-inlet, steel-cased, Sirocco exhaust fan, running 218 r.p.m., belt-connected to a General Electric 50-hp. induction motor, running 895 r.p.m. The main slope is the main intake and the manway the return. Each heading is furnished with a separate split of air, the return from the right side being overcasted over the slope, and the manway being undercasted across the left-hand headings.

The main pump station in the mine is between the third and fourth right headings and all the water made above this point is drained directly to this sump. The pump here is an electric-driven Alberger, two-stage centrifugal, working against a head of 270 ft., and having a capacity of 500 gal. per min. Below this and pumping to it, is another Alberger electric driven, single-stage, 500 gal. per min. capacity pump, rated for 125-ft. head. The sinking pump is an electric-driven Aldrich, triplex, portable, 120 gal. per min. capacity pump, rated for a 270-ft. head.

Considerable firedamp is given off, but it is carried out and rendered harmless by ample ventilation. This is naturally a damp mine, water dripping over the coal everywhere, so that there is absolutely no dry dust and

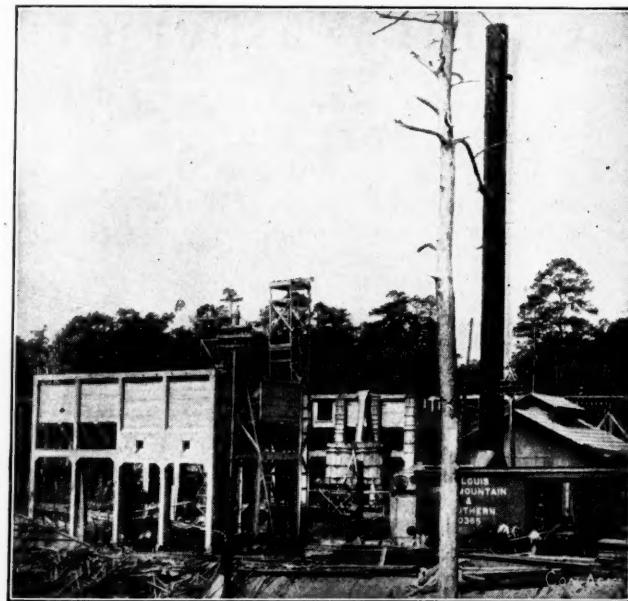


FIG. 3. VIEW SHOWING THE WASHED-COAL BINS

humidifying is entirely unnecessary, even in winter. The slope is single track and laid with 60-lb. rails. In the rooms are laid 16-lb. steel rails on one side and 3x4-in. wood rails on the other, the latter being used to help hold the loaded cars coming out of the rooms.

Iron-frame, wood mine cars of 4800 lb. capacity, having side bumpers and swinging end gates, are used, the couplings consisting of a link and two clevises. Eight cars to the trip are hauled out of the slope by a Hardie-

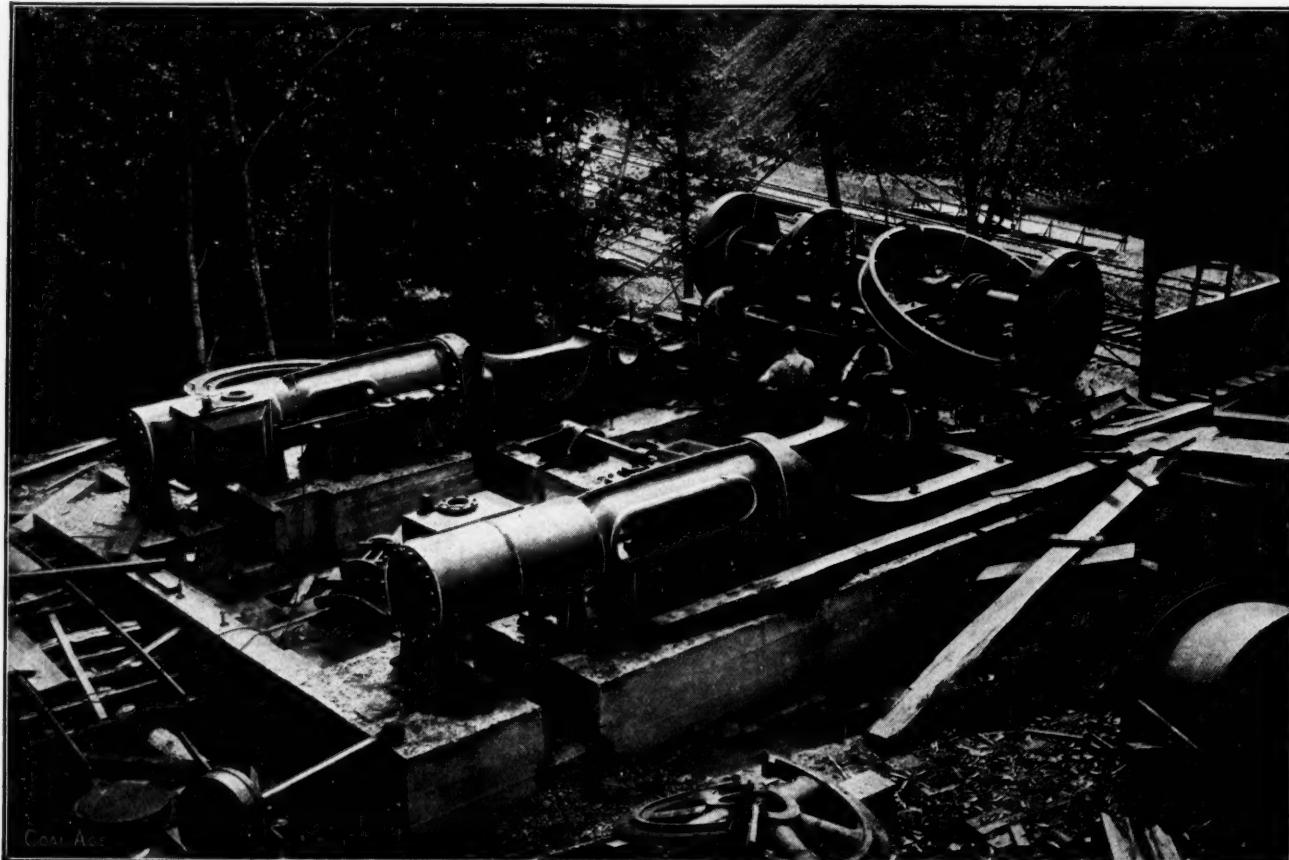


FIG. 2. THE 28x48-IN. FIRST-MOTION HARDIE-TYNES HOIST BEING ERECTED

Tynes duplex, 28x48-in., first motion hoisting engine, having a single 8-ft. drum; steam for this is furnished by two 200-hp. Walton, Chattanooga, Tenn., boilers, having one stack 60 in. in diameter 120 ft. high. Fig. 2 is a photograph of the hoisting engines being erected, the end of the tipple showing on the right. In this picture will be seen a large pile of coal stored across the tracks, which was obtained while driving the slope before the railroad was built. There is an electric-driven auxiliary hoist, consisting of a 75-hp. General Electric induction motor, geared to a 4-ft. drum, for driving the slope and turning new headings in the mine.

SCREENING THE COAL

The tipple is on a direct line with the slope track, and when a trip is landed, the cars are handled by gravity over a Phillips crossover dump, then over a switchback to the empty track, where they are attached to the rope and dropped down the slope. Fig. 4 is a photograph of the tipple and yard under construction, the former being of frame. The screens were built by the Montgomery

Signal Lights for Single Track

By C. J. FUETTER*

A number of mines are using electric haulage motors which, for some reasons, must pass over the same track for a certain distance. In such mines it is almost necessary to provide some arrangement so that only one motor at a time will have the right-of-way on this portion of track. Some mines have telephone systems, but these are not effective for the purpose.

The safest and most economical arrangement is to have an electric-lamp signal as shown in the accompanying figure. This consists of two lights of the proper voltage, connected in series, two single-pole double-throw switches, two fuses and enough of No. 14 B. & S. rubber-covered copper wire to be strung the full length of that particular place in the track. Suppose both switches to be in the upward position, giving a live wire but no return, and consequently no light. Then, the motorman to arrive at the signal light first, will throw the switch downward and light up the system, giving him the right-



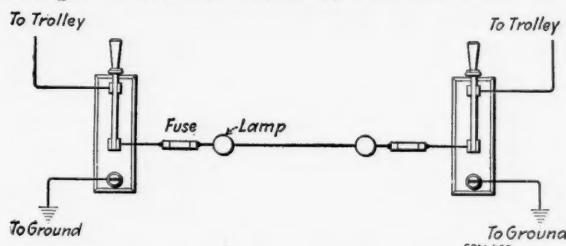
FIG. 4. GENERAL VIEW OF YARD TRACKS AND TIPPLE DURING CONSTRUCTION

Washer Co., of Birmingham, and consist of two parts, working in opposite directions, to equalize vibration. The upper section has 6x16 ft. of screening surface, with 4-in. perforations, and the lower one is the same size with 2-in. perforations. The lump coal from the upper screen passes over a 36x16-ft. traveling picking belt, where it is hand picked before dropping into the railroad car for shipment. The other two sizes over and through the 2-in. perforations are loaded separately and shipped to the washer. All the machinery at this plant is electrically operated, except the main hoist, by power from the washer generating plant.

William J. Hand is superintendent of this mine, and W. J. Lovejoy, mine foreman; 150 miners and 50 day hands are employed. All the employees are housed in company houses, 150 in number, mostly 4-room, and of the same construction and dimensions as those at the washer, except a few larger ones for the mine and office officials. There is also a commodious company commissary, operated for the convenience of the employees, where they can buy all the necessities as cheap or cheaper than can be done elsewhere. The inside of this building measures 100x40 ft., in addition to which is an ice house and well equipped meat market.

of-way. When he reaches the other end, he throws the switch downward, darkening the lights, showing that the section is clear.

The next motorman will repeat the same operation to get his right-of-way, with this difference, that instead of throwing the switches downward, he will throw them up-



WIRING DIAGRAM FOR BLOCK SIGNAL

ward. Under no conditions must a motorman change the switches in any way when the lights are bright, as somebody else has right-of-way. Should the signal get out of order, no light can be obtained. In that case no motorman should enter the single track before signal is again in working condition.

*Harding P. O., W. Va.

WHO'S WHO—IN COAL MINING

The legislature of Pennsylvania, which is credited with doing nothing without a political motive and whose politics is said to be swayed continually by the lure of the dollar, has managed to keep its mining and geological departments, among some others, remarkably free from graft. Geology is a study which attracts men who are not of a domineering or acquisitive nature, and to whom politics for its own sake or for hope of reward is utterly repellent. The ability of the geologist is rarely developed by men whose minds are diverted by their personal interests.

J. P. Leslie, for many years state geologist of Pennsylvania, chose men who were enthusiasts like himself. As one recalls the names of the men who were young enough to have a career after their service closed, one cannot recall a single instance of a man who failed to make good in his after life, and to justify the confidence Leslie placed in him.

They have all become elder brethren in the mining industry, doing far more than their share to stir its inner life and mold its later progress. It has been said that every Pennsylvanian is a geologist. The general interest in the strata of the hills and valleys of that state has been continually fostered by the able monographs of the second geological survey.

Among the *protégés* of J. P. Leslie, should we not rather say his stalwart supporters, was William Griffith, the eldest child of Andrew J. and Jemima (Sax) Griffith. He was educated in the public and private schools of West Pittston, Penn., and at Lehigh University. He taught school for one term in New Albany, Bradford County, Penn., and on holidays and Saturdays he surveyed near-by farms.

In 1878 he went West and secured a position as transitman and assistant engineer for the Union Pacific Railroad Co., for which he surveyed and supervised the construction of railroads in Nebraska, Idaho, Montana, Utah and Colorado. He returned East at the Christmas season of 1880, and became division engineer for the Lehigh Valley R.R., residing at Bethlehem, Penn. Two years later he became an assistant geologist on the Geological Survey of Pennsylvania, being located successively at Pottsville, Hazleton and Bernice, and mapping the Schuylkill, Lehigh and Bernice coal measures.

From 1884 to 1886, inclusive, he was engaged in pri-

vate engineering practice at Pittston, Penn. During 1887 and 1888, as assistant state geologist, he had in charge the completion of the geological survey of the Wyoming & Lackawanna coal fields.

After this work was finished, he opened an office in Scranton as consulting mining engineer and geologist. Since that time he has prepared numerous economic geological reports, many of which have appeared in print and had extensive circulation in Canada, England and Holland, and some have been translated into German and French for circulation in Europe.

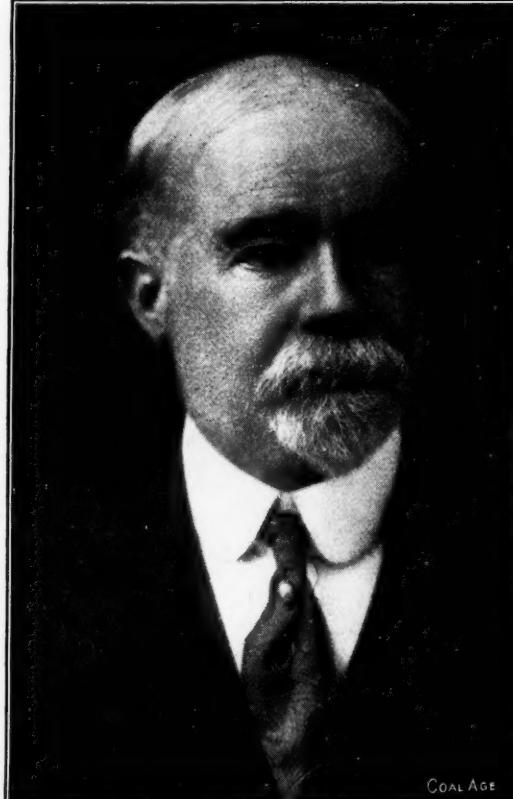
Among the most notable articles from his pen was an extended monograph entitled "Anthracite Coal with Estimates of Reserved Supply." This appeared in the "Bond Record" of New York and attracted widespread attention in business and financial circles. In 1892, Governor Pattison appointed him a member of a commission to inquire into the possibilities of utilizing the waste in mining anthracite.

In 1895, he purchased a tract of anthracite at Wyoming, Penn., organizing and becoming president of the Wyoming Coal and Land Co., which operated a colliery for a number of years until it was sold to the Lehigh Valley Coal Co.

In 1897 and 1898, he investigated and rendered a report on the anthracite deposits of northern Peru, both on the Pacific slope and on the head waters of the Amazon River. From 1906 to 1908 he examined and re-

ported on the coal resources of the Matanuska valley in Alaska, being the first to recognize the high-grade character and coking qualities of the Matanuska coal. In fact, he manufactured on the ground the first coke ever made in Alaska. At one time or another he has visited all parts of the United States and Canada, including the more distant parts of the latter dominion, Vancouver and Queen Charlotte Islands.

In 1908 he was appointed by the Court of Northumberland County, Penn., a member of a commission to fix the taxable value of all the coal lands in that county. In 1910, with Eli T. Conner, he was appointed by the advisory committee to the city of Scranton to investigate the risks to which the city was exposed by the extensive mining work being prosecuted beneath it, and the report made was published by the Bureau of Mines.



WILLIAM GRIFFITH

COAL AGE

EDITORIALS

Use of Explosives in Mines

It is entirely proper that explosives used in mining coal should be subjected to rigid tests. The only wonder is that the movement in this direction in the United States was so long delayed. The safety of our underground workers and the preservation of our mining property make it incumbent that the inquiry be extended indefinitely.

The advent of a flameless explosive would be welcomed by the whole industry; however, this is asking a great deal of the manufacturers of permitted powders. It is quite generally realized that even the best of our permitted explosives fall short in this respect under the crucial test of actual use. There is no doubt but that the present products have been improved until they more nearly approach the ideal than was ever the case when we used any and all powders with indifference as to their safety qualities.

The experience of Great Britain in the matter of testing explosives for use in underground work is of interest to the industry in this country. During recent years the British have formulated one Coal Mines Order after another, until legislation on this subject in that country is quite complete.

A survey of the most recent British acts shows among other things the following requirements: The storage of explosives underground is prohibited, and the workman must bring his remaining stock out at the end of his shift, or deliver it personally to the workman succeeding him in his room or entry. The mine owner must provide facilities on the surface for storing the powder. For use below, the explosives must be in cartridges in a secure case or canister, in which it must be kept until required for charging shot holes. If the explosive contains nitroglycerin, proper warming pans have to be provided.

Detonators are under the control of the mine manager, or some specially appointed person. When issued to shot-lighters, the latter must keep the detonators in a locked case separate from any other explosive until about to be used.

Concerning the charging and firing of shots, the British rules are somewhat exacting. A shot-lighter must see that all persons in the vicinity take proper shelter before firing, and the hole may be fired only by means of an efficient magneto, electrical apparatus or a fuse complying with stated conditions. In case a shot misses fire, careful search for the detonators and charge must be made; if they are not found, the coal must be loaded under the supervision of the person firing the shot, or one of the mine officials. After being loaded, this coal is sent to the surface in specially marked cars.

Only permitted explosives may be used in seams in which gas has been found within the previous three months, "in such quantity as to be indicative of danger." In mines not naturally wet throughout, the use of permitted explosives is required in "any road or any dry and dusty part of the workings, or any shaft or drift com-

municating therewith which is in process of being sunk, deepened or enlarged."

The wages of the appointed shot-lighter must not depend on the amount of coal to be gotten, and no person shall be qualified for appointment as a shotfirer, unless he has obtained the requisite certificates as to his ability to make accurate tests for inflammable gas, and as to his eyesight. Before firing, the shot-lighter must examine the place where the shot is to be fired and all contiguous places within a radius of 20 yd. for the presence of inflammable gas; and, also, he must examine the floor, roof and sides within a 5-*yd.* radius, for coal dust, and render all dust harmless that may be within such area.

It might be well for coal operators in this country to follow the example set by European nations in this matter of providing stringent regulations concerning the use of explosives in coal mines. A few states have taken steps in this direction, but the movement should be more general and the laws more uniform in character.

♦

Reducing Ventilation When Firing

With this issue closes a discussion that has been at once interesting and profitable, in breaking down or at least *forcing a passage* through one of the high walls of prejudice surrounding the practice of coal mining.

Although the discussion has in no wise proved the truth of the claim that "greater safety is assured by reducing ventilation when firing," it has clearly pointed the way to a new field of investigation that promises developments that may lead ultimately to a practical solution of the mine-explosion problem, which thus far has successfully baffled both science and practice in their efforts to discover its hidden secrets.

Mining practice has dealt with the problem of the prevention of explosions of gas and dust in mines, by diluting the explosive atmosphere with air—the very element on which the explosion depends—much as a child's appetite for sweets is broken by an overdose of the same.

Recently, suggestions of a variety of different methods of treatment are being offered. Many of these, as wet zones, stone-dust zones, the Taffanel barrier, etc., have been tried with varying results. And now comes the latest suggestion—the depletion of the oxygen content of the air, by diluting the mine atmosphere with extintive gases.

The Harger suggestion of doing this "by introducing the waste gases of the furnaces, into the intake air current" has not been taken seriously by practical men, because of the known poisonous character of these gases; and even could this element of danger be eliminated, there would still remain the difficulty of rightly gaging the percentage of gas necessary to prevent ignition and which would not be inimical to life. The margin is a narrow one.

The question of reducing the circulation of air in the mine when firing, by closing the discharge opening at the

mouth of the upcast shaft, has appealed to many practical men as a good suggestion, applicable to all but gaseous mines; where according to general opinion, such a proposition could not be considered, owing to the rapid accumulation of dangerous quantities of firedamp.

It has been rightly urged by a number of our correspondents that this question should receive the earnest attention of the federal Bureau of Mines, and that a series of suitable experiments should be undertaken to ascertain what, if any, advantage may be gained by this practice, and to what conditions it is applicable. We heartily commend this suggestion and hope that the Bureau of Mines will be able, soon, to throw some light upon this subject about which there is so much speculation.

♦

Importance of Rail Bonds

The unfortunate property of electricity of taking the line of least resistance has been the cause of many urban troubles. Electrolysis and the deterioration of concrete are prominent among these. However, until the recent experiences at the mines of the St. Bernard Mining Co., in Kentucky, detailed by C. J. Norwood, the state geologist and chief inspector of mines of that state, the danger of stray electrical fields at collieries was not made clear.

Efficient bonds and adequate returns may, from now onward, assume an entirely new aspect. They may be regarded not merely as good investments; but as essentials, the use of which is to be enforced by laws and regulations.

If a permissible explosive had not been used at the mine in question, the men who were present at the premature explosions recorded would have been killed and their deaths would have been wrongly charged to their carelessness. Fortunately, the flame of the explosive was so short that the men could state what occurred.

In all three cases, the copper needle was in the hole when the cartridge exploded. In two cases, the powder had been in the hole for some time and had not been ignited. The presence of the copper needle seemed necessary to conduct the electricity. This raises the question whether in mines where extensive electrification has taken place, it is well to use metal and especially copper needles without some kind of protecting insulation.

W. C. Waddell, an electrical engineer, ascertained that a fair average of the current required to fire the permissible powder under investigation would be 25 volts and 0.30 ampère and to fire black powder 0.35 ampère. As Professor Dates obtained voltages of 25 volts between an air pipe and the lower dirt band and several of 12 volts between that parting and the mine floor, it is easy to see how an explosion could arise, especially if the needle tended to convey the current between two pyritiferous masses in one dirt band or from one dirt band to another. It was shown by H. B. Dates' experiments that the dirt and sulphur bands carried nearly twice as high a voltage as the cleaner coal of the seam.

Conclusions must be drawn with due conservatism, but it may be necessary in some instances not only to provide good bonds but a shorter return to the surface than is afforded by the mine tracks. As the resistance of mineral bodies, likely to be encountered, is apparently not known, it is impossible to form an estimate of their relative conductivity compared with iron. Moreover, much work remains to be done to ascertain the ampérage by which powders may be exploded.

Too High an Efficiency

In our Feb. 1 number, we printed an editorial calling attention to the remarkable performances accredited to some mine fans, no approach to which has ever been attained in any careful or scientific laboratory test. In this issue we print an article describing a recent fan installation. This states that the efficiency ranges between 79 and 83 per cent.

We cannot but believe that the men making the test from which these efficiencies have been derived were deceived in securing their own data and that the real performance of the fan was considerably below the figures named.

In making the above statement, we do not wish to be misunderstood as casting any reflection whatever upon the veracity or accuracy of the observers; neither are we inclined to question the reliability of the Hydro-gage used, as the basic principle of this instrument is the Pitot tube, the accuracy of which has been firmly established.

If one will observe the flow of water in any stream, he will notice that the swiftest part of the current may or may not be in the center, but the movement close to the edge is quite different from both maximum and average velocity. Furthermore, that the only sure method of determining the average rate of flow, with any current meter, is by making a complete traverse of the entire cross-sectional area of the stream.

Coming back to the efficiency of the fan in question, we are much disposed to doubt that the velocity of the air at the point or points of measurement represented a correct average of the rate of flow across the entire heading or airway. And, if this did not represent the true average, the capacity or performance of the fan as reckoned from it would necessarily be erroneous.

♦

Simultaneous Shot Firing

As to the advisability of firing shots simultaneously, in a coal mine, experienced mining men in the United States are divided in their opinions. The question was disposed of with considerable finality in Great Britain by the most recent Explosives Order. The British rule bearing on this problem provides that "Except in driving a stone drift, or in sinking pits, two or more shots shall not be fired in the same place simultaneously." In stone drifts the number of shots that may be fired at one time shall not exceed three, unless fired electrically in series.

In the United States, a number of mining companies have adopted the simultaneous-shotfiring plan, exploding all shots by electricity from the surface, after every man has been withdrawn from the workings. The officials at the mines where this plan is followed vouch for the success of the scheme, claiming that falls of roof are not increased thereby.

It may be suggested as a safeguard in firing simultaneously by electricity that the current should be thrown in, once only. When the switch is thrown a second time there is likelihood of a blowout shot occurring when the mine atmosphere has just been filled with gas and dust. A Western mine was severely damaged some years ago when this latter plan was followed.

SOCIOLOGICAL DEPARTMENT

A Winter First Aid Meet

BY J. G. SMYTH*

An interesting series of meetings was held under the auspices of the Miners' Y. M. C. A., of Jenkins, Ky., during the week beginning Jan. 20, 1913.

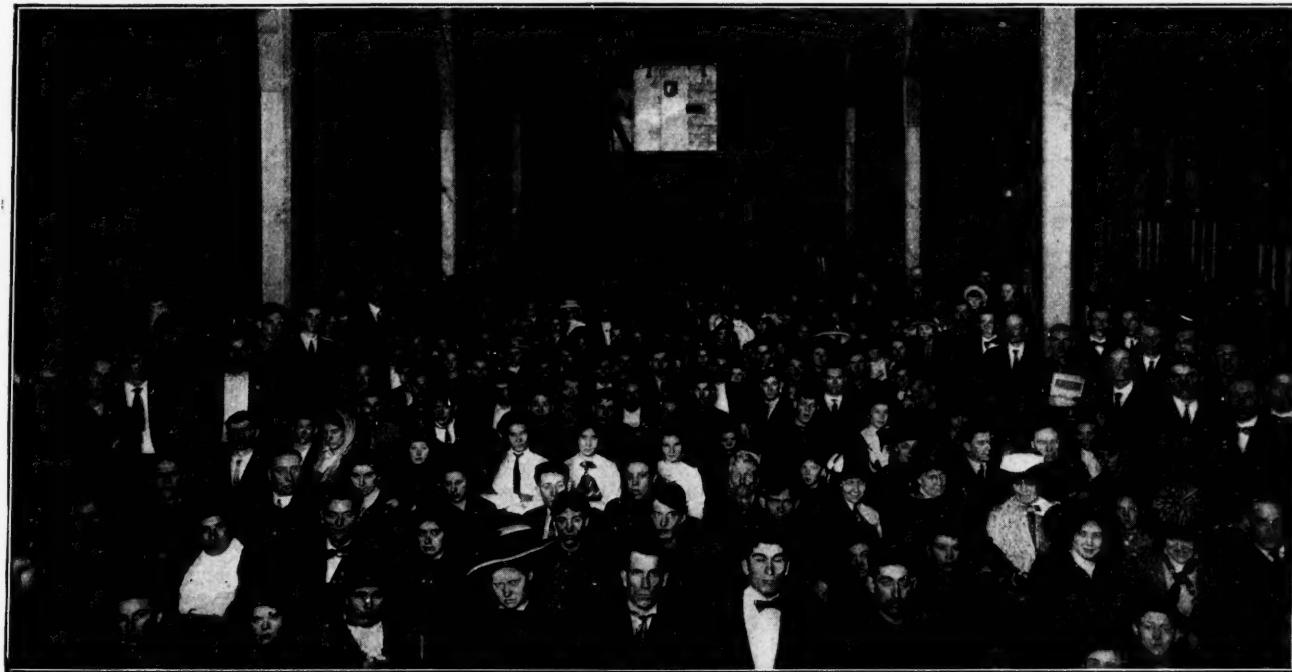
P. C. Dix, state secretary of Louisville, Ky., was present, and the Industrial Department of the International Committee of the Y. M. C. A. was represented by Peter Roberts, who is author of a system of teaching English to foreigners, which enables them to discuss mining subjects after a few lessons, and of books on the immigration problem, especially in relation to mining.

ing officer. Mr. Dix introduced as the first speaker D. J. Price, who gave a history of the mine-safety work of the U. S. Bureau of Mines.

J. R. Fleming then described the large first-aid meeting held in Pittsburgh in 1910, illustrating his remarks with moving pictures.

THE ASSIMILATION OF THE FOREIGNER

The concluding speaker of the evening was Dr. Peter Roberts, who, in a forceful address, proved to his listeners the economic value of the foreigners who are daily arriving at our shores, and the place they have and will have in developing the natural resources of our land. He



GATHERING AT FIRST-AID MEETING HELD IN THE

MINERS' Y. M. C. A., JENKINS, KY., JAN. 21

D. J. Price, J. Henson and J. R. Fleming, of car No. 7, which has been located at Jenkins for three weeks, also gave their assistance. During their stay, they have instructed six distinct classes, of nine men each, in the use of the helmets and pulmotor in mine-rescue work. They have also given about 60 men a course of first-aid training.

ALMOST A WEEK OF SAFETY PLANNING

Although a preliminary lecture, illustrated with moving pictures, was given at the Burdine Y. M. C. A. on Monday, Jan. 20, by J. R. Fleming, the meetings really opened with a dinner and conference at the home of W. N. Ewald, secretary of the Jenkins Y. M. C. A.

The first session of the institute was held on Wednesday, Jan. 22, with State Secretary P. C. Dix as presid-

clearly brought out the fact that immigrants do not reach their maximum efficiency until thoroughly assimilated into our civilization, or until they have become naturalized citizens of our country.

On Thursday night, J. R. Fleming gave an interesting and instructive lecture on mine safety, which was illustrated by stereoptican slides and motion pictures, taken by the U. S. Bureau of Mines.

Doctor Roberts addressed this meeting, dwelling principally on the part the Y. M. C. A. is taking in educational work among working men, and made a plea for the attendance of the men in and about Jenkins at the educational classes to be conducted by the Y. M. C. A. at that town.

The week culminated in a first-aid contest, the teams competing being taken from the various mines in and about Jenkins, and including two teams from the engineering department.

*Manager, Consolidation Coal Co., Kentucky Division, Jenkins, Ky.

Six men from each of the seven mines constituted the teams, the personnel of which was as follows:

Mine 201

Tom Thomas (Captain)
John C. Yates
M. D. Ramsey
L. D. Mann
Lester Schrum

Mine 203

R. P. Jenkins (Captain)
M. C. Penix
S. S. Wright
R. S. Gunther
Tom Patton

Mine 205

George Christopher (Captain)
J. B. Williams
Melbourne Boggs
R. W. Smith
James Sisk
David Campbell

Mine 202

Charles Smith (Captain)
M. F. Eskew
Fred Hemphill
Harry Smith
W. A. Perry

Mine 204

L. Tomlinson (Captain)
Joe Rickett
P. B. Dent
Tom Cummings
C. Bowling

Mine 206

John Huston (Captain)
Ed. Garret
Jim Short
J. A. Roberts
Steve Jones

Mine 207

J. H. Johnson (Captain)
J. S. Creech
George Rodick
R. F. DeBusk
Paris Smith
W. H. Smith

Engineering Dept., lower division**Engineering Dept., upper division**

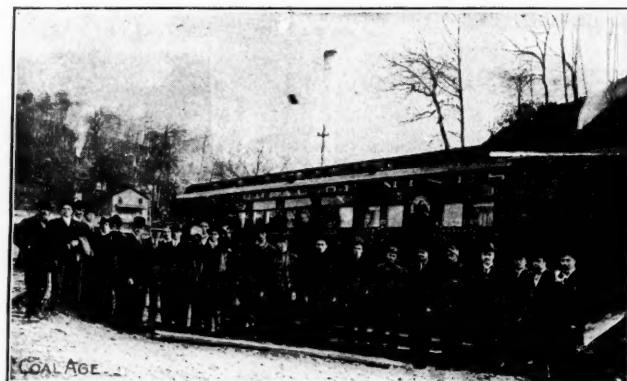
L. L. Holmes (Captain)
W. H. Robinson
J. C. Metger
Lawrence Malone
A. B. Walter
W. L. McLane

C. G. Evans (Captain)
Paris Fitzpatrick
A. J. Baldwin
Frank Fisher
C. W. Rhodes
J. C. Fiman

The list of 15 problems had been furnished the men, the first of the week for practice, and from these 15, the following four problems were selected, which were only

division of the Engineering Department, second prize by team of mine 204, and third prize by team of mine 205. J. B. Williams, of mine 205, won the one-man event.

On Friday afternoon, for the benefit of the teachers in the Jenkins schools and for those who will instruct the class in English, which is to be conducted under the auspices of the Y. M. C. A., Doctor Roberts gave a demonstration of his method of teaching English to foreigners. A crowd of about 30 aliens of varied nationalities was



MINE RESCUE CAR NO. 7 AND CLASSES OF CONSOLIDATION COAL CO. EMPLOYEES AT JENKINS, KY.



PETER ROBERTS, AUTHOR OF SYSTEM FOR TEACHING ENGLISH TO ALIENS, INSTRUCTING A CLASS OF FOREIGNERS IN "MINE TALK," FOR CONSOLIDATION COAL CO.

given to captains of the various teams at the time that the problem was to be demonstrated.

- No. 1 Burns on the face, neck, ears, breast, arms and hands. Burned completely from waist up
- No. 2 Bad cut on top of head on right side, severe bleeding, broken left collar bone, right leg broken below knee with bone stuck out on right side.
- No. 3 One-man event. Man overcome by gas, found with broken right arm below elbow. Perform one-man shoulder lift and carry to place of safety.
- No. 4 Man found lying on back over electric wire, unconscious with bad burn on back. Artificial respiration.

Three impartial judges were chosen. About 800 people were present, the number being limited by the accommodations. Special trains were run from the different mines to Jenkins to accommodate the people interested in their particular teams. The first prize was won by the lower

gathered in the assembly room of the new office building of the Consolidation Coal Co., and although by careful examination all were eliminated who had any knowledge of English, yet in about 45 min., Doctor Roberts proved conclusively that he had the foreigners not only using but also thoroughly understanding the first lesson.

All the meetings were held in the large auditorium of the temporary Y. M. C. A. building at Jenkins, and at each meeting, the capacity of the hall was taxed. It was decided in a conference to form classes in English for foreigners and in arithmetic and mine work for miners.

DISCUSSION BY READERS

Reducing Ventilation When Firing

Letter No. 16—The discussion, thus far, seems to have been confined more to the questioning of certain statements of facts, rather than to the ascertaining of the reason for such facts. The experiences recorded in the letters of Mr. McAllister apparently contradict all we have been taught in relation to the prevention of explosions. It has always been considered important to keep the mines free from accumulations of explosive gas, by means of an ample air current, which we have been taught serves two purposes: (1) The pressure causing the circulation of air acts to oppose the expansion of the gases generated in the mines. (2) The air current dilutes, renders harmless and carries away these gases.

One naturally concludes from this teaching that when circulation ceases, the gases held back by the ventilating pressure expand and fill the working places of the mine, forming with the air explosive mixtures of firedamp. That this teaching and conclusion are true, and that an explosion would occur if such firedamp mixtures came in contact with flame or become otherwise ignited, is unquestionable. That an explosion did not occur, in the experiments of Mr. McAllister, is sufficient indication that these conditions favoring an explosion did not exist.

We observe Mr. McAllister states that when the fan was stopped there was still an air current of 30,000 cu.ft. per min. passing in the mine, produced by natural ventilation. He rightly regards this as a dangerous condition, because such a current, even in an ample airway, would have a velocity sufficient to carry dangerous quantities of coal dust in suspension in the air, besides supplying the danger zone in the mine with a large quantity of oxygen, which is the supporter of combustion. There were thus present the two elements regarded by all mining men as the most potent in the propagation of an explosion. The danger in this case was overcome, as stated, by sealing up the upcast shaft with heavy doors, which stopped this natural circulation.

It may be assumed that as long as the temperatures producing the natural air column in the mine remained unchanged, the pressure producing the natural circulation still existed. The outlet being closed, the condition in the mine would be the same as when a forced fan is working on a closed drift or mine. The pressure would be maintained and would be, perhaps, more effective in preventing the expansion of the gases than when the air was in motion.

If this reasoning is correct, the mine at the time of the experiment presented the following conditions: (1) A constant pressure opposing the expansion of the gases and thus far acting to prevent an explosion. (2) A limited supply of oxygen, the quantity being determined by the capacity of the airways in the danger zone. (3) The absence, to a greater or lesser extent, of coal dust in the mine atmosphere, owing to the lack of circulation of air.

I believe such conditions must have an important bear-

ing on the limitation and prevention of an explosion. While the experience of Mr. McAllister is unique, I do not consider it contradictory or inconsistent with the conditions known to be characteristic of explosions. He seemingly succeeded in turning an element of danger into a factor of safety, which was possible to do in his case, because the pressure was maintained while the circulation was stopped. On the other hand, had the circulation been stopped by sealing up the intake opening instead of the return opening, I believe we will all agree that the experiment would have resulted disastrously.

Coal mining has no greater problem demanding a solution than that of the prevention of explosions—the king of terrors underground. I am inclined to think that experiments should be conducted along the lines suggested by this discussion, to prove the efficacy of the proposition and to show its limitations in practice, or to expose the error of such a method.

I. C. PARFITT.

Jerome, Penn.

♦

Letter No. 17—Referring to the discussion on reducing ventilation when firing, I would say that while there have been some points advanced in favor of such practice, and these were seemingly supported by experience and the results reported were good, the arguments are not strong enough to induce me to abandon the old-school practice. Like the man from Missouri, I think enough has been said against the system and I can add but little.

In case a mine is generating explosive gas, it would be very unsafe to stop the ventilating fan or reduce its speed. When the shots are fired after all the men, except the shotfirers, are out of the mine; or when a number of shots are fired at one time on a single entry, I am in favor of having the shotfirers begin firing on the return end of the air current and advance with their work against the air. By so doing, the smoke and gases will not be carried past any place yet to be shot; and this eliminates the chances of flame being projected into what might be a dangerously explosive atmosphere. The shotfirer thus always has a clear atmosphere for his work and can make the proper test for gas and feel satisfied with his examination; whereas, if the places were full of smoke and gas, he would be doubtful in making the necessary examination before firing the shot.

When this system is strictly carried out, with an air current sufficient to keep the split or mine in a healthy condition; or, in a dusty mine, if the place where a shot is to be fired is well watered for a distance back from the face, say 25 or 30 yd., the chance of an explosion taking place will be reduced to such an extent that I would feel much safer in the mine while shotfiring was in progress, than if the speed of the fan were to be reduced or the fan shut down.

For example, I will cite one case, that of the Harwick mine explosion, in 1904, when 179 men were killed.

The air current in the mine was nearly shut off by the freezing up of the airshaft, and very little air was traveling through the mine, especially in that portion of the mine where the explosion took place; here the air current was hardly perceptible. I think this instance may serve, at least, to offset similar ones that have been given in favor of reducing the ventilation when firing.

F. W. CUNNINGHAM.

Mine Inspector, 21st Bituminous Dist.
Charleroi, Penn.

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Letter No. 18—The question of reducing the ventilation in a mine, at the time of firing shots, is so foreign to the average mining man's belief, that at first glance it seems absurd. There are mines where this experiment can never be tried, for the reason that the miners would leave their places in a hurry the moment they discovered the fan had been slowed down.

To reduce or shut down the ventilation, in any mine producing a large amount of gas at the working face, would be to court disaster. On the other hand, former Mine Inspector Verner and others have called attention to this subject, for some time; and this, together with the experiences described by Mr. McAllister, in his recent letters in COAL AGE, has placed this subject beyond the category of mere conjecture. If there is any truth in the theory, its practical application must be ascertained and the conditions clearly demonstrated.

More or less of the same theory has been recently strenuously advocated by Prof. Harger, in a series of lectures, in England. Prof. Harger contends that the lowering of the oxygen content in the mine atmosphere, will reduce the liability to explosion. While I am unable to believe that the arguments advanced apply to mines generating gas freely, I can see that the theory may have an important application in mines subject to the dangers of a coal-dust explosion. A coal-dust explosion is merely a rapid form of combustion and must require a large amount of oxygen to propagate the explosive wave. Under these conditions, it is reasonable to believe that the chance of a dust explosion will be naturally lessened by reducing the supply of oxygen.

While it may be shown, later, that the same argument can be applied likewise to a gas explosion, I fear such a conclusion would surely lead to disaster. My opinion now is that, in a mine free from gas but liable to dust explosion, greater safety may be secured by reducing or entirely stopping the ventilation when firing shots. I do not, however, accept this theory as a panacea for all the ills of coal mining.

JAMES HOLDEN, Supt.,
Princeton Coal & Land Co., Ltd.
Princeton, B. C., Canada.

♦

Letter No. 19—I have read with great interest the discussion of the question of reducing ventilation in mines when firing. I am employed, every afternoon, in the work of inspecting shots. I note some writers favor reducing the ventilation, while others would increase it, at firing time.

My opinion is that when conditions will permit, the ventilation should be entirely stopped before firing is begun; that is to say, provided there is a proper system of shot inspection maintained in the mine. Every hole should be examined by a competent person to as-

certain that it is properly placed and cleaned out before it is charged. Only permissible powder should be used in blasting and the holes should be tamped with wet clay.

I believe in electric firing when everybody is out of the mine. I do not believe in the employment of shotfirers who must make their rounds, firing one or two shots at a time, when all the men have left the mine but themselves. If the mine is not safe for the men, it is not safe for the shotfirers; and what is more dangerous still, the mine air is often heated and loaded with coal dust, which makes it ready for an explosion to occur upon the slightest mistake of a shotfirer.

We have in our mines one of the best systems of firing possible. Each afternoon, the firebosses, carrying the electric detonators in a leather bag, visit every working place, examine each hole to be fired, see that the place is well sprinkled with water, make up the necessary charge of powder and see that it is put to the back of the hole and the hole properly tamped with wet wood pulp, which we use for tamping.

All electric currents are turned off at the end of each shift. The wiremen then go around, couple up the shots, put in the switches and return to the surface. The fan is then stopped for 20 min., before firing, and remains so for a few minutes after the shots have been fired. After starting the fan again and giving time for the air to clear, in the mine, the wiremen go below to examine for fire and take out the switches.

We fire, in this way, from 150 to 200 shots, at the end of each shift; and I have never yet found the least evidence of any trouble having occurred, when making my morning examination as fireboss.

WILLIAM ROTHWELL, Fireboss.

Castle Gate, Utah.

♦

Letter No. 20—In regard to reducing ventilation when firing shots in a mine, I would say at once and without any qualification that I consider such a proposition a retrograde step. It is a parallel to the suggestions of Dr. Harger, as expressed in his recent book on the "Prevention of Explosions and Mine Fires."

Assuming, however, that the shots are to be fired in the working places and not on the roadways, the danger of explosion would be less, owing to the coarseness of the dust at the face. Also, whether we consider a longwall face or a bratticed room, the air current is seldom a serious obstacle to the expansion of the gases produced in firing.

In a mine generating firedamp, I cannot imagine that any sane man would advocate closing off the ventilation either wholly or in part, at any time. The Mines Regulation Act (Canada) and the mining laws of most states require the maintenance of a current of air sufficient to dilute, render harmless and carry away the gases generated in the mine. If this rule is to be disregarded, mine officials would be at liberty to adopt the "Harger theory," and reduce the oxygen content of the air current to 17 per cent., and introduce, say 1 1/4 per cent. of carbon dioxide into the air current.

In my own experience, I have never had charge of a mine where it was possible to shut down the ventilating current without causing an immediate accumulation of firedamp in the workings. Besides the accumulation of firedamp, the shutting down of the ventilation would

introduce another danger; namely, large quantities of carbon-monoxide gas, produced by firing in a dust-laden atmosphere and a limited supply of air, would accumulate in the rooms and chambers to an extent that might prove fatal to the shotfirers should they have to return to a room where shots had been fired.

The reading of some of the letters, especially those of Mr. McAllister leads one to conclude that the mine air, in the cases mentioned, must have contained a low percentage of oxygen. It would be interesting to know the exact composition of the air in the mine at various points, at the time indicated in Mr. McAllister's letters. To make the investigation complete, an analysis of the coal should also be given to show the inert dirt contained in the seam, and which probably played an important part in preventing an explosion.

In closing, permit me to say that the whole proposition of reducing ventilation in mines, at firing time, appeals to me only as an excuse for reckless blasting. Although the theory seems to have some support, from the instances given, the details are insufficient to be conclusive.

JAMES ASHWORTH,
Mining Engineer.

Vancouver, B. C., Canada.

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Oxygen Supply as Affecting Mine Explosions

The discussion on reducing ventilation when firing naturally draws attention to the oxygen supply necessary to support combustion in mines where coal dust or firedamp abounds.

In mines where the coal is blasted, the explosion of a large quantity of powder, at one time, undoubtedly has a tendency to decrease the percentage of oxygen in the mine air, at the working face. This is due, not to the consumption of the oxygen of the air by the powder in explosion, as the powder is supposed to contain its own oxygen supply; but the large quantities of carbon dioxide produced by the explosion of the powder naturally reduce the percentage of oxygen in the mine air in the immediate vicinity.

At present, authorities differ as to the reduction of oxygen percentage that is necessary to prevent the ignition and explosion of otherwise explosive mixtures. Dr. J. Harger, England, states that *comparative* safety in mines may be obtained by a reduction of from 1 to 2 per cent. in the oxygen content of the air and the introduction of about $\frac{3}{4}$ per cent. of carbon dioxide; and adds that *absolute* safety will be secured by a reduction of $3\frac{1}{2}$ per cent. in the oxygen content and the introduction of from $\frac{1}{2}$ to 1 per cent. of carbon dioxide.

G. A. Burrell, chemist of the Bureau of Mines, gives, as a result of his laboratory experiments, a much larger percentage of reduction in the oxygen content of air as necessary to prevent the ignition of an explosive firedamp mixture. In fact, Mr. Burrell's figures are, approximately, double those of Mr. Harger (COAL AGE, Jan. 18, p. 105). The oxygen content given by Mr. Burrell as necessary to prevent the ignition of firedamp, would not probably support human life. In commenting upon the results of his experiments, Mr. Burrell states (p. 106): "If all conditions are identical the mixture will explode less violently and less completely in proportion to the decrease of oxygen percentage."

Mine air always contains less oxygen than outside air. The deficiency of oxygen, in the air that is traveling through the mine, may vary from 0.1 to 0.2 per cent. or even more, while at advancing faces, under ordinary conditions, the deficiency may reach 2 per cent. or even more in extreme cases.

It is to be sincerely hoped that more uniformity of results will be obtained by future experiments. If it is true that, under certain conditions possible in mining, the deficiency of oxygen may amount to 2 or more per cent., it might be assumed that in such workings an explosion of gas would be practically impossible, according to Doctor Harger's figures, inasmuch as we may be reasonably sure that from $\frac{1}{2}$ to 1 per cent. of carbon dioxide will also be found at the face of such workings. It is in this connection we are to look for whatever benefits may be derived from reducing the ventilation at the time of firing in mines, since, by reducing the air supply, the oxygen percentage will be decreased and the carbon-dioxide percentage increased.

Experience shows that mine explosions frequently originate on the first of the air and the explosive wave travels toward the intake or fresh air. While this fact is significant, it is true that there are frequent exceptions to the rule. If the recoil of a violent explosion extends in by from the point or origin, there is generally found little evidence of flame, particularly in territories where shots have recently been fired.

Investigations of a few dust explosions in the Pittsburg (Kansas) field proved that, in every case, the explosion originated on the first of the air and traveled toward the intake. The significant feature, in this connection, was that the dust on the intake was not as dry as that at the working faces. It is the general practice in this field to change the direction of the air current whenever the section on the first of the air is giving trouble. By this change, the troublesome sections of the mine are placed on the last of the air, and the trouble ceases.

While I am fully aware of the danger that might arise, in gaseous mines, if the circulation were to be materially reduced at the time of firing shots, I am still of the opinion that, in a dusty mine, there is a benefit to be derived from limiting the oxygen supply at the time of firing, as described in the letters of Mr. McAllister, recently published in COAL AGE.

I wish to heartily endorse the suggestion that has been made that the Bureau of Mines, which is well equipped for carrying on extensive experiments, should undertake the experiments necessary to prove or disprove the theory that greater safety is obtained by the reduction of the circulation of air at the time of firing shots, in mines, under different conditions.

Although, it is true that cutting off or reducing the ventilation, in an experimental mine, might not produce a mine atmosphere precisely similar to that found in a regular working mine, where the air becomes diluted with a noticeable percentage of carbon dioxide very quickly after the ventilation is reduced. In this connection, we will be glad to afford opportunity to any representative of the Bureau of Mines to obtain samples of the air, in mines where the fan is entirely stopped for from 30 min. to 1 hr. before firing shots.

C. W. WATERMAN,
Genl. Supt., The Fleming Coal Co.
Pittsburg, Kan.

EXAMINATION QUESTIONS

Rescue Work and Appliances

Ques.—How would you proceed to enter a mine after an explosion, and how would you conduct the rescue operations?

Ans.—Much will depend on the extent and violence of the explosion. The first step is to ascertain what damage, if any, has been done to the mine openings and the ventilating apparatus. Any damage to the fan or fan drifts should be promptly repaired, or temporary arrangements should be made for producing the necessary ventilating current in the mine. Observe if the air current is taking the same direction as usual, or if it has been reversed by the explosion.

It is important in entering the mine to follow the fresh air current, and the above observations are generally of importance, even though rescue apparatus is available and a trained rescue corps is at hand ready to enter the mine by any available opening. There is generally more hope of rescue by following the air, but this course may be modified by the conditions existing in any particular mine.

In the absence of an organized rescue corps, an immediate call should be sent out for volunteers and, from these, experienced men should be selected and a rescue party organized under the leadership of a competent miner who is thoroughly acquainted with the mine and the conditions existing in the workings. The party should be equipped with approved safety lamps and tools, such as picks, axes and hammers, necessary for the work.

Upon entering the mine, careful tests should be made of the mine air, to ascertain what poisonous qualities it may have aside from its explosive condition. For this purpose, the rescue party should carry with them, in addition to safety lamps, caged mice or birds, and constantly observe how these are affected by the atmosphere of the mine.

The aim of this first rescue party is to make as rapid advance as possible; exploring, as they go, every nook and corner where it is possible someone may still have survived the explosion. Only such work of repairing doors and stoppings and erecting brattices should be performed, at this time, as is necessary to conduct the air current forward so as to make it possible to explore the rooms and headings.

A second party should be organized, at the surface, to follow the first party and supply them with whatever is needful to expedite the work of rescue. As survivors are found, they should be promptly treated by first-aid methods and removed from the mine.

Ques.—Would you allow any class of workmen to enter a return airway contaminated by gases coming from a mine fire; and, if so, for what purpose would you allow them to enter?

Ans.—No one but the most experienced miners should be permitted to enter a return airway, under these conditions and, then, only when protected with an approved form of rescue apparatus that will permit the wearer to

live surrounded by a poisonous atmosphere. Such a return airway should be entered only for the purpose of rescue or for the performance of such work as is absolutely necessary for the extinction of the fire or preventing its spread.

Ques.—If the safety lamp gives no indication of the presence of gas, is this fact proof that the atmosphere is safe to enter?

Ans.—No. The atmosphere, in a mine, may be poisonous to that extent as to be instantly fatal, owing to the presence of carbon monoxide in the air. The percentage of the gas present may be so small that the gas will escape detection on the lamp. Its presence can only be ascertained by the blood test; or by observing the effect of the gas on small caged animals, such as mice or birds. These small animals are much more quickly affected by this gas than is the human system. Their action will therefore serve as a warning for men to vacate the place and seek fresh air.

Ques.—How would you determine which of two different kinds of rescue apparatus is the better for given conditions in the mine?

Ans.—Before entering the mine the wearer should test each apparatus in the smoke room and find out which is the most suitable to him. The conditions in the mine, however, largely determine which type should be worn. If the conditions within the mine are known and no irritating gases are likely to be met, I would prefer the Fluess apparatus; but if fires have to be contended with I prefer one of the helmet type.

Ques.—Suppose you were wearing a rescue apparatus while hurrying into a mine to save a man; and you suddenly felt as though you could not get your breath under normal working conditions. What would probably be the cause and what would you do?

Ans.—As the apparatus is regulated to give 122 cu.in. of oxygen per minute, which is the amount necessary under normal working conditions, it is probable that by hurrying more was required and this supply of oxygen, therefore, was not sufficient; and he found that he could not breathe. To overcome this condition sit down and rest until the supply of oxygen is again sufficient. Then be careful not to exert yourself more than is required to perform the work.

Ques.—How would you test a rescue apparatus before giving it to a man to wear?

Ans.—Make sure that the apparatus is properly charged. The apparatus should be tested to see that it is giving off the required amount of oxygen per minute, and to see that the pressure on the intake tube and the vacuum on the return tube is not, in either case, greater than 3.94 in. water gage. Be careful to note also, that all connections are air-tight.

Before going into a mine, the man should be required to put on the apparatus and go into a room filled with the fumes of burning sulphur. This will detect any leakage in the apparatus.

COAL AND COKE NEWS

Washington, D. C.

The action of Attorney-General Wickersham in filing a new suit on Feb. 13 against the Delaware, Lackawanna & Western Ry. Co. and the Delaware, Lackawanna & Western Coal Co. under the Sherman anti-trust law had been expected for some time past. J. C. MacReynolds, counsel for the Government in this suit, explains the purpose of the action as that of securing from the Court a judgment on the question whether persons in control of a railroad company can organize among themselves a corporation which continues under their management and through the form of a contract escape the prohibitions of the commodities clause of the Interstate Commerce law, while it was also intended to apply the Sherman act so as to restrict railroads to the business of common carriers by preventing them from entering into contracts or arrangements tending to interfere with the performance of their duties under such contracts.

Attorney-General Wickersham in outlining the object of the suit says:

The purpose of the railroad company and those who controlled it in organizing the defendant coal company was to use the latter as a mere instrumentality for retaining under their direction and for their profit the business of selling coal theretofore carried on by the railroad; and under the agreement of Aug. 2, 1909, this purpose has been carried into fruition.

They have always constituted its dominant stockholders and probably always will. They elect its officers, determine its policies, and, moreover, they may take away its sold business upon six months' notice. If its conduct should fail to meet their approval, it may be deprived of all benefits under the sales contract and its business quickly destroyed. In such event a similar subterfuge could be organized and the profits of the entire business still be secured to the stockholders of the railroad.

The arrangement under which the defendant companies are operating in no proper or legal sense destroys the interest which the railroad company has in the output of the mines which it owns and operates or in the coal which it purchases from others before the same starts in the course of interstate or foreign transportation, but during the entire course of such transportation the carrier has an interest therein within the true meaning of the statute.

The two companies are but the instrumentalities of the same group of stockholders; the arrangements and contracts between them are but devices to avoid the prohibitions of the Interstate act, and operations under them are more damaging to the public than those under the old plan prior to August, 1909.

They have enabled the coal company to acquire a monopoly of the sales of coal produced along the defendant railroad, and through the exclusive use of the instrumentalities leased by the latter, and otherwise this monopoly will be continued.

Having secured for itself a monopoly, the defendant railroad successfully undertook to transfer this to the coal company, and, unless prevented, such monopoly will continue to the great detriment of the public.

Furthermore the contract between defendants necessarily hinders the railroad from freely fixing its rates for transporting coal according to recognized and legitimate standards, and introduces a factor into the determination of questions relating thereto which may not be considered consistently with the rights of the public, and which necessarily tends to keep such rates unduly high. For since under the contract the railroad company receives for its coal at the mines a percentage of the price at New York harbor, which price is largely determined by the freight rates, it follows that the higher the freight rate from the mines to New York harbor the higher the price received by the railroad company at the mines, and, on the other hand, as the freight rate decreases such price decreases.

The contract is thus not only a barrier against any reduction in the railroad company's freight rates to New York, however justified by the conditions, but is an inducement to higher rates regardless of any change in the cost or character of the service. It is in undue, unreasonable and unlawful restraint of interstate and foreign trade and commerce.

Municipal Coal Mines

Mr. Taylor, of Colorado has offered the following bill for the establishment of a "municipal coal mine."

That the following-described coal land or so much thereof as the city of Grand Junction, Colorado, may apply for within six months after the approval of this Act, is thereby granted to said city as a source of coal supply for the use of said city and for the use therein of the inhabitants and industries thereof, to wit:

In section ten, the east half of the east half.

In section eleven, the southwest quarter and the southwest quarter of the southeast quarter, the west half of the northwest quarter and the southeast quarter of the northwest quarter.

In section fourteen, the north half of the northwest quarter and northwest quarter of the northeast quarter.

And in section fifteen, the northeast quarter of the northeast quarter, all in township one north, range one east, of the Ute meridian, containing six hundred and forty acres, more or less, upon the following conditions, that is to say: That said city shall, within two years from the approval of this Act, open a workable vein of coal upon said land and shall continuously thereafter develop and operate a practical coal mine thereon for the purpose aforesaid; shall not assign or transfer said land or any interest therein; shall comply with such rules and regulations as may from time to time be prescribed by the United States Bureau of Mines and approved by the Secretary of the Interior.

Mr. Taylor has also continued this same policy in a general way by offering the following measure:

That the Secretary of the Interior is hereby authorized, in his discretion, to patent lands of the United States classified as coal lands within any State or Territory to any city or incorporated town therein, duly authorized in this behalf, as a source of coal supply for the use of such city or town and for the use therein of the inhabitants and industries thereof, the lands so patented to be conveniently situated with reference to such city or town. Every such patent shall include not to exceed six hundred and forty acres for each city and one hundred and sixty acres for each town. It shall be appropriately conditioned to provide for prompt and continuous development of the coal, the prevention of any assignment or transfer of the land, the safeguarding of the health and safety of laborers mining or handling the coal, the prevention of undue waste of mineral resources, and the securing of full reports and publicity as to the mining and disposal of coal mined under the patent, including costs of construction, of maintenance, and of operation, use for municipal purposes, sales, and receipts from sales, all in such manner and form and at such times as the Secretary of the Interior may by rules and regulations prescribe.

PENNSYLVANIA

The mine inspectors' examination in the bituminous region of Pennsylvania will occur in March. The examinations for mine foreman, assistant mine foreman and firebosses, in the bituminous districts of the state, will take place in April. The dates of these examinations will be announced later.

Anthracite

Wilkes-Barre—The Bliss colliery was idle Feb. 4 as a result of the smashing of the cage. Work was resumed, however, the following day.

Questions of importance to the Miners' Union were considered Feb. 12, when the members of the three anthracite district boards met. The call was issued Feb. 11. President White attended.

In addition to the provisions for rescue and first-aid work now in force in the anthracite coal mines, the Lehigh Valley Coal Co. is now putting into service a mine-rescue car which can be rushed at a moment's notice to any colliery in case of accident. This car consists of a remodelled passenger car equipped with oxygen breathing apparatus and several kinds of first-aid equipment.

Scranton—The Scranton school board has gone to court in an effort to force the Scranton Coal Co. to furnish them with maps showing the underground condition at the corner of Washington and Vine Sts., where the board is contemplating the erection of a new school building, and about which they have been unable to obtain any information from the coal company.

Bituminous

Harrisburg—Senator Sensenich, of Westmoreland County, has presented a bill aimed to take the appointment of mine inspectors in the bituminous region out of politics. It makes specific provision that the Governor must appoint inspectors in the order of rank of percentage. The candidates making the highest mark must be appointed first. This bill has been endorsed by several coal operators, while others oppose it. The present law gives the Governor the option of appointing as inspector any man passing the examination with an average over 90 per cent.

Beulah—The Beulah Coal Co. has filed suit in the United States District Court against the Pennsylvania R.R. Co. to recover \$50,000. The coal company alleges that the Pennsylvania company illegally discriminated against them in awarding and distributing of coal cars to their mines in the Clearfield district.

Indiana—Six thousand acres, including practically all of the unsold coal in Green township, this county, has been optioned by Elmer E. Davis, of Johnstown, representing Philadelphia capitalists. In the tract is a solid block of 2000 acres near Pine Flats, which was obtained at \$70 an acre. The options expire May 1.

WEST VIRGINIA

Charleston—Manufacturers of South Carolina have united in a complaint to the Interstate Commerce Commission of alleged excessive and unreasonable freight rates on coal from West Virginia fields to cities in South Carolina. The petition is directed against the Norfolk & Western and its connecting lines.

Bluefield—An appropriation of \$70,000 will be made for the purpose of establishing a mine-rescue station at Norton. A rescue car will be stationed there and will have easy access to mines in the West Virginia fields.

Bridgeport—Arrangements have been completed for the transfer of 1500 men and 22 locals from this district of the United Mine Workers to District No. 3, which centers about Mansfield. Mar. 29 has been set as the date for the district convention, and New Philadelphia as the place for meeting. The action taken will then be ratified. The reason for the transfer is said to be that the miners involved do not work the Pittsburgh No. 8 vein, which is worked by the miners of the eastern portion of the district. As a result, difficulty in adjusting the scale is always arising.

Tiltonville—Work has been resumed at the Red Mud mine north of Martin's Ferry after a ten days' strike. A mass meeting was held and the members voted to abide by the order issued by John Moore, president of the Ohio miners, and return to their work.

MARYLAND

Baltimore—Announcement has been made of the establishment of a joint new coal rate by the New York Central & Western Maryland R.R., from the Pittsburgh district to Baltimore piers. For the first time in the history of the Pittsburgh coal industry, competition with other coal fields is thus made possible in seaboard coal markets. This action also opened to Pittsburgh the growing coal export trade.

TENNESSEE

Knoxville—The fourth annual banquet of the Southern Appalachian Coal Operators' Association was held in Knoxville, Tenn., on the evening of Feb. 11, at the Colonial Hotel, with a fine attendance. Col. James R. Wooldridge, of Wooldridge, Tenn., presided as toastmaster.

KENTUCKY

Lexington—The recent order of the Interstate Commerce Commission suspending railroad schedules providing for cancellation of point rates for the transportation of coal from Kentucky and West Virginia mines to Wisconsin points via the Pere Marquette R.R. has been attacked in a brief filed by the Chesapeake & Ohio Ry. Co. The company contends that no public necessity exists for the establishment or continuance of a through route from the fields indicated to northwestern territory via Toledo and the Michigan lake lines. The commission is asked to vacate its order, and to permit the company to haul its coal over its own lines to Chicago.

OHIO

Columbus—Fire of unknown origin destroyed the offices and yards of the Murray City Coal Co. and the Hocking Valley Ry. tracks, Columbus, early Saturday morning, Feb. 15.

General Mine Inspector John C. Davies has appointed Thomas E. Grogan, of Cardington, Ohio, as district mine inspector in Belmont County to succeed Thomas Hennessy, who resigned on account of ill health.

INDIANA

Indianapolis—The coal-mine operators of Indiana are greatly interested in the proposed transportation of coal from the Indiana and Illinois coal mines to Chicago by pipe line. This scheme is said to be well under way by Chicago financiers. The plan is to pump the coal by hydraulic power, which it is claimed can be done at a cost impossible for the railroads to meet.

Isham Randolph, engineer, the expert behind the project, is emphatic in declaring the plan perfectly feasible, and that coal could be delivered in Chicago cheaper than at present and that the new process will revolutionize the coal-carrying trade. It is said that the right-of-way for the pipe line and branches has been quietly obtained.

Bloomfield—The Summit coal mine, one of the oldest in the Greene County field, has been flooded ten days or more, and all efforts to lower the water have proved futile. The mine is on low ground, and it is believed water from some abandoned mine is pouring into the Summit. The owners have almost decided to abandon the place, which means a loss of several thousand dollars worth of mining machinery, to say nothing of the unmined coal and the miners' loss for lack of employment.

Petersburg—The Ingle Coal & Coke Co. is taking leases

on hundreds of acres of coal land in the vicinity of Augusta, Pike County. They are paying \$20 an acre for the coal. The Ingle company is now operating seven mines along the Southern R.R., and employs seven hundred miners.

MISSOURI

Kansas City—An order has been granted by United States District Judge McPherson, in the Federal Court, restraining the Chicago, Burlington & Quincy R.R. from tearing up seven miles of track on the spur known as the Adair County R.R., which runs seven miles northeast from Youngstown to the property of the Great Northern Fuel Co., at Novinger. It is claimed that the absence of a railroad there would make the Great Northern property worthless.

COLORADO

Denver—The itinerary of the Denver Rescue Car No. 2 is given as follows:

Town	Arrive	Leave
Frederick (mail Segundo), Colo.	Feb. 23	Mar. 1
Madrid, N. M. (Albuquerque & Cerillos Coal Co.)	Mar. 2	Mar. 8
Carthage, N. M. (Carthage Fuel Co.)	Mar. 9	Mar. 15
Gallup, N. M. (Diamond Coal Co.) (Victor-American Fuel Co.)	Mar. 16	Apr. 5

FOREIGN NEWS

Brussels, Belgium—King Albert has stepped into the breach in an effort to avert the general strike which has been called to go into effect throughout Belgium in April. The King has advised the cabinet to make concessions to the Labor Party and Socialists. The 200,000 Belgian miners who have grievances are anxious to go out.

PERSONALS

A. F. Harper has been transferred as resident engineer of the Woodward Iron Co.'s coal mines from Dolomite, Ala., to Mulga, Ala.

King J. Ellicott has assumed active management of the Operator's Coal Co., taking the place recently made vacant by the resignation of E. O. Hoover.

J. Q. Clarke has severed his connection with the Pittsburgh Coal Co. as assistant sales manager at Buffalo, and has opened an office there on his own account under the name of the Monongahela-Youghiogheny Coal Co.

In the latter part of May President John Moore, of the Ohio mine workers, expects to leave for Europe to attend the International Mining Contest. During his absence Vice-President John Valenka, of Bridgeport, will be in charge of the state organization.

Wemyss Jackson has been appointed general sales agent of the Consolidated Indiana Coal Co., with headquarters at 139 West Van Buren St., Chicago. Mr. Jackson is to be in general charge of the sale of coal in place of Frank Ragan, who at his request, is appointed district sales agent, with headquarters at 403 Terminal Traction Building, Indianapolis, Ind.

TRADE CATALOGS

THE ALBERGER PUMP & CONDENSER CO., 140 Cedar St., New York City. The Hammond water meter. 8 p., 8½x11 in., ill.

CONSTRUCTION NEWS

Akron, Mich.—Tracks are being laid by the Handy Bros. Mining Co., of Bay City, to a point near here, where two coal shafts will soon be sunk.

Wilkes-Barre, Penn.—The D. and H. company is contemplating erecting a washery some time in the near future between Honesdale and Waymart.

Philadelphia, Penn.—The Keystone State Construction Co. has secured a permit for a coal trestle 22x220 ft. on the east side of Broad street south of Sedgley avenue, for the Pennsylvania Railroad; cost, \$12,500.

Fort Wayne, Ind.—Kendallville business men have a

proposition to establish a factory for the manufacture of peat fuel from bogs. It is the desire to establish a factory with a capacity of 50 tons per day.

Shamokin, Penn.—Local mining engineers of the Reading Coal & Iron Co. today completed plans for the sinking of a new shaft at the Sterling colliery. The company is also preparing other plans for the greatest improvements in the history of collieries in this region.

Waynesburg, Penn.—Engineers are making the location for new mines and coke plants about a mile above the Poland Coal Co.'s new works up Dunkard Creek, new developments are to be made by the Henderson and Kennedy interests of Pittsburgh. About 400 coke ovens are to be built at once.

Shenandoah, Penn.—Plans for the breaker to be built for the Locust Mountain Coal Co., which will operate the new Girard Estate lease, are nearing completion and materials and machinery will be brought in February so that construction can be commenced about April 1. A 6000-ft. drainage tunnel will be started about the first of March.

Seranton, Penn.—The Minooka Coal Co. has leased from the Delaware & Hudson Co. a tract of land containing more than 70 acres, situated South of Minooka Park. The location is known as the old Corey Tract.

It is the intention of the Minooka company to erect a \$25,000 breaker on this site. The company also expects to mine more than 200,000 tons of coal from the land, and this product will be prepared at the new breaker.

St. Louis, Mo.—A byproduct coke oven and recovery plant is to be erected by the Laclede Gas Light Co. on a 200-acre tract of land at the junction of the River Desteres with the Mississippi. The cost is to be approximately \$5,000,000, and the plant will have a capacity of 250,000 tons annually.

In connection with the coke-oven plant, the company will build an additional water-gas plant, power stations, pumping stations, and machinery for handling the 500,000 tons of coal that will be consumed every year for the manufacture of coke and the byproducts.

Ironon, Ohio—It is reported that the Semet Solvay Co., of Syracuse, N. Y., is negotiating with the Rogers-Brown Co. for the installation of a coke plant similar to their million dollar plant at Ashland, Ky., for supplying coke for the local furnaces. The Ashland plant has a capacity of about 700 tons daily, and a plant of similar capacity would supply coke for the furnaces of this city. It is also stated that the Rogers Brown Co. will erect a large blast furnace at Ashland. Should another coking plant be installed here, it will prevent the frequent coke shortages at the furnaces.

Brownsville, W. Va.—A contract has been let to R. J. McFadden by the Hitchman Coal Co. for the sinking of a new shaft to connect with the new coal which that firm owns at the Glendale mine. The contract price is said to be about \$10,000, and it is aimed to complete the work by the 1st of May.

The new opening will be made on the Bell property, on Little Grave Creek. It is said that a new up-to-date structural-steel tipple will be erected upon the completion of the new shaft. The mine will be equipped with the most modern machinery, and will have one of the largest outputs in this section of the state.

NEW INCORPORATIONS

Paris, Ohio—The Caney Cannel Coal Co.; capital stock, \$1000. Incorporators: P. J. Johnson, Wm. Kenney and F. M. Farres.

Mayo, Ohio—The Hampton Timber Coal and Land Co.; capital stock, \$25,000. Incorporators: B. M. Craft, John M. Allen and C. C. Craft.

Pittsburgh, Penn.—The Buffalo Creek Coal Co.; capital stock, \$25,000; to operate in Butler and Armstrong Counties. Incorporators: C. A. Ross, C. B. Clark, C. L. Glass, C. E. Meyer and G. M. Bilger.

Greensburg, Penn.—A charter was granted the Greensburg Coal & Coke Co. at Harrisburg Saturday, \$200,000. The new company will operate a tract of about 600 acres of coal north and west of this city.

Pittsburgh, Penn.—A special meeting of the stockholders of the Wellsley Oil Co. will be held Mar. 27 for the purpose of voting on a proposed decrease in the capital stock of the company from \$500,000 to \$5000.

Boston, Mass.—The Belmont-Monroe Coal Mining Co.; capital stock, \$1,000,000. Promoters: William B. Crowther, James O. Evans, Pittsburgh, Penn., C. L. Andrews, L. L. Coleman and R. S. Buzzell, Augusta.

Montgomery, Ala.—Papers have been filed reporting the incorporation of the Syracuaga Ice and Coal Co. of Talladega County; capital stock, \$15,000. Incorporators: F. W. Ledbetter, A. B. Parker, and Ethel Ledbetter.

Fairmont, W. Va.—The Mineral Fuel Co.; capital stock, \$1,200,000; to develop coal and other mineral lands in Letcher County. Incorporators: A. B. Young, G. M. Alexander, Brooke Fleming, Jr., J. O. Watson and Walter Miller.

Vaughan, W. Va.—The Lewis Land & Coal Co.; capital stock, \$400,000; to develop mineral land and deal in real estate in Nicholas County. Incorporators: E. W. Knight, G. S. Couch, Jr., F. F. Brown, A. W. McDonald, and O. P. Fitzgerald.

Wheeling, W. Va.—The Washington Oil & Gas Co.; capital stock, \$15,000; to acquire real estate and explore for gas, coal and other minerals. Incorporators: B. E. Thompson, R. J. Desch, Geo. Haid, R. S. Magie, J. R. Rowan and J. E. Hughes.

Wilmington, Del.—The Coal Savings & Smoke Consuming Co., \$1,000,000. To establish foundries for the purpose of manufacturing coal saving devices and install the same on stoves, etc. Incorporators: R. Boyd Cooling, Clarence J. Jacobs, Harry W. Davis, all of Wilmington, Del.

Pittsburgh, Penn.—Alberta Development Co.; to deal in all kinds of mineral lands in the state of New Mexico and elsewhere. Capital stock, \$300,000: Incorporators: Preston B. Ewing, Thomas H. McKay, E. W. Ewing, and J. Albert McKay, of Pittsburgh and Lloyd L. Little, of Emsworth, Penn.

Connellsville, Penn.—The Northumberland Coal & Coke Co., operating three miles south of Somerset, will apply for a charter on Feb. 25. The incorporators are R. C. Fiss and James Christian, of Shamokin; E. G. Jones and V. S. Truckenmiller, of Watsontown, Penn. and E. H. Mayer of Somerset. The company has opened mines on the Frank Walter and Robert C. Bittner farms in Milford Township. W. H. Mayer has charge.

Hartford, Conn.—The Schniewind Coke Oven Co., of Hartford, has been formed to manufacture illuminating gas and coke and use the by products. Capital stock, \$500,000. Incorporators: Robert C. Metcalfe, of Newark, N. J., and Alvan Waldo Hyde and Charles Welles Gross, of Hartford.

Allen, Ky.—The Mayo-Hampton Timber, Coal & Land Co. has been organized by B. M. Craft and others, with a capital stock of \$25,000. The company proposes to acquire timber and coal lands for development.

INDUSTRIAL NEWS

Easton, Penn.—The Easton Coal & Coke Co. will occupy a site at Belmont and McKeen streets. Frank McInerney is president.

Fairmont, W. Va.—The Consolidation Coal Co., will equip its collieries at McRoberts, Ky., with five 10-ton 42-inch gage electric mining locomotives.

Indiana, Penn.—The Armerford Coal Mining Co. have opened coal developments on Blacklick Creek, on the site of the old John R. Wilson farm.

Huntington, W. Va.—Twelve mines are now operating on the Buffalo extension of the G. V. Ry. above Logan and put out something like a hundred cars of coal daily.

Waynesburg, Penn.—Attorney G. C. Drake has purchased 50 acres of coal land in Gilmore township at \$160 per acre. The tract was formerly known as the John D. Russell farm.

Marshall, Mich.—While sinking a shaft at the Sheridan township mine, coal was struck at a depth of 72 ft. The seam is 5 1/2 ft. thick, and the operators believe that the strike will prove profitable.

Punxsutawney, Penn.—W. S. Blaisdell expects to be shipping coal from the mines which are just being opened on Williams Run, near No. 6 mine, of the Anita Coal Mining Co. about midway between Punxsutawney and Horatio.

Morgantown, Ky.—G. L. Drury, C. E. Sullivan, J. C. Haney, of Union County, have purchased the West Aberdeen Coal Co.'s property, and are now repairing the mines to be put into operation.

Philadelphia, Penn.—Colonel T. Coleman du Pont, the powder manufacturer, with many diversified interests, has effected a merger of six bituminous coal companies with an annual output of more than 10,000,000 tons a year. The capital is \$6,000,000.

Derby, England—John Davis & Son (Derby), Limited, of All Saints' Works, Derby, England, and care of Messrs. J. F.

McCoy Co., of 157 Chambers St., New York, have been granted letters patent by the U. S. Patent Office for their "Davis-Biram" anemometer.

Pittsburgh, Penn.—At a special meeting of the stockholders of the four States Coal & Coke Co., the first stock of the company was increased from one and a half million to two and a half million dollars. This concern was the 11th in production in West Virginia for 1912.

Carrollton, Penn.—It is reported that the Logan Coal Co. is negotiating for the purchase of a 130-acre coal tract near the operation of the Black Diamond company at this place. It is reported that John Hayes and William Mardemer of this place may take over the mine.

Grafton, W. Va.—The Preston Fuel Co. is owner of about 5000 acres of coal land at Independence and is opening up the same. A shaft is to be sunk to a depth of 210 ft. and a steel tipple will be built. The work is in charge of R. B. Stewart, superintendent and manager.

Huntington, W. Va.—A deal involving \$500,000 and the transfer of a tract of valuable coal and timber land in Logan County was closed recently. Six thousand six hundred acres on Buffalo Creek were sold by Huntington and Charleston capitalists to the Buffalo Coal & Coke Co.

Connellsville, Penn.—The Knickerbocker Fuel Co., with mines at Hooversville, Somerset County is a new firm in that field. The company expects to mine 600,000 tons during 1913. Officers Jas. A. Hill, New York, president Frank M. Graff, Blairsville, treasurer, Telford Lewis, Johnstown, secretary.

Waynesboro, Penn.—J. E. Barnes, of Pittsburgh, has secured options on 2500 acres of coal land in Whitley township, at \$400 an acre. It is reported that he secured the option for the Pittsburgh Coal & Coke Co., and that the option extends for 90 days.

Waynesburg, Penn.—J. B. F. Rinehart of this place closed a deal recently with Justice W. S. Mankey, of East Waynesburg, whereby he was granted title to the Pittsburgh vein of coal underlying a tract of land containing a little over 100 acres, situated near Nineveh, Morris township, the price per acre being \$125.

Summerset, Penn.—Captain Sanner, L. G. Lambert and J. Shaver have listed their options on a tract of 6000 acres of coal in this county. The option price was \$50 an acre. The purchasers of the tract have not been made known, but it has been given out that the men holding the option have sold out to a firm which will develop the tract.

Tuscaloosa, Ala.—A. S. Costellono and associates from Jacksonville, Fla., have purchased 320 acres of coal land at Shira's Station near Tuscaloosa, on the Tuscaloosa Mineral L. & N. Railroad from Miss Margaret Miller and Messrs. John T. Bradford and C. M. Peterson. Purchasers expect to ship much of the coal which they will soon mine.

Windsor, Mo.—The Brownington Coal Co. expects to begin operation soon on a large scale. They have been stripping some coal for the past several weeks with teams and scrapers, but expect that their new 95,000-lb. steam shovel will soon be on the ground. They have a fine 4-ft. seam of coal near the surface, the depth ranging from 9 to 13 feet.

Connellsville, Penn.—Announcement has been made that the Pennsylvania Coal & Coke Co. is prepared to fire up 1000 ovens in the Allegheny Mountain coking region. Greene County coal will probably be used. The ovens have a capacity of about 12,000 tons per month. Byproduct ovens will also be built at Midland to run on this coal which is floated down the river in barges.

St. Louis, Mo.—Dr. J. C. Parrish, representing the Audrain Coal Co. of Vandalia, Mo., announced the closing of a deal with the Laclede-Christy Clay Products Co., of St. Louis, by which about 300 acres of coal lands in northeast Missouri, overlying a rich vein of fire clay are transferred. For the present the fire clay will be shipped to the St. Louis factory of the company.

Newark, N. J.—The H. W. Johns-Manville Co. announce the removal of its Newark office to 239 Halsey St. Its new office and salesroom is located on the ground floor of a modern building right in the heart of the city's business center. With a floor area of 4000 sq. ft., ample space is afforded for the display of a varied line of J-M asbestos roofings, packings, pipe coverings, etc.

Colorado Springs, Colo.—Alexander Patterson has exposed a body of coal one mile north of Pikeview on the land owned by Dorr, Flosson & Meridian. The value of new seam is estimated at several hundred thousand dollars. A shaft 14x7 ft. was in the course of construction when this bed was struck at a depth of 371 ft. Mr. Patterson says that he will arrange to extract 1000 tones a day.

Des Moines, Ia.—The Madison coal mine at Twentieth

street and Hickman avenue sustained a \$3000 loss when the engine house and boiler room were destroyed by fire. The origin of the fire, which was discovered by Carl Miller, night watchman, is unknown. The loss is partly covered by insurance. Repairs were begun at once and the company will continue operations.

Salt Lake City, Utah.—By the middle of February the Spring Valley Coal Co. expects to have its coal upon the market of the West. This is the enterprise brought into being by the Jesse Knight interests of Provo, and a wide market for the coal is being prepared by Lewis M. Cannon, the general sales agent for the company. The company has equipped the mines for a daily coal production of 2000 tons.

Pineville, Ky.—The Continental Coal Corporation has recently sold, at its offices in Pineville, Ky., all of the standing oak and poplar on 10,000 acres of its coal properties in Bell and Knox Counties, in this state, to Carr Bros., of Nashville, Tenn. The purchasers propose to erect on Straight Creek a large mill for the immediate working up of the timber in that vicinity. It is estimated that it will take several years to go over all of the timber purchased.

Reynoldsville, Penn.—Two years ago the McConnell Coal Co., of Reynoldsville, secured the mining rights of the Denison and Ross tracts above Coal Glen, consisting of about 300 acres of coal and established a colliery on the tract. This mine has developed into a large producer. A few weeks ago the McConnell coal interests secured a large tract near Sugar Hill and a force of men is now putting in drifts and equipment for the development of the tract. A new tipple is being erected.

Clarksburg, W. Va.—W. W. Fowler, owner of the Calvert Coal & Coke Co. and the Calvert Coal Mining Co., has purchased two mines now in operation and producing 600 tons of Kanawha splint coal daily. Mr. Fowler took over the entire holdings of the Ceste-Kanawha Coal Co. and the Ceste-Kanawha Merchandise Co. The acquisition of the two splint mines gives Mr. Fowler's company the advantage of being the only company in West Virginia producing the four best varieties of coal mined in the state.

New York, N. Y.—The sales of the Western Electric Co. will be between 71 and 72 millions for the year 1912, which is slightly more than in 1906, the previous largest year in the company's business. The increase has been in American sales outside of the Bell System, which have increased about 100% over 1906, and in European sales, which were the largest in the company's history. The results have been accomplished by an energetic selling campaign in the face of increased and increasing competition.

Barbourville, Ky.—Local coal operators, among them W. M., S. H. and J. R. Jones, have acquired a valuable coal acreage on the outskirts of Hazard, Perry county, and will install one of the largest mining plants in that newly opened district. The mines will be electrically equipped and the company will seek a franchise from the town of Hazard for operating an electric-lighting plant. In the event arrangements are made, the same power plant will be used to operate the mines and furnish the town with electricity.

Stoyestown, Penn.—Owners of a tract of about 6000 acres of coal land lying between Stoyestown and Shanksville have been notified that options taken about three months ago will be lifted and that the money, \$50 an acre, will be received by the owners probably within a week. The company making the purchase is not known, but the agent who has been working in the field is A. G. Smith, of Lehigh County. The options were taken by Capt. Sanner, L. G. Lambert, and Joseph Shaver, all Somerset County men. Deal will mean the transfer of about \$300,000.

Chicago, Ill.—The Western Electric Co. has recently placed upon the market a new dry battery, to be known as the red label blue bell battery. It is designed for intermittent service requiring high efficiency and rapid recuperation. This new battery is a result of careful development work extending over a long period.

The Red Label battery is of the high initial amperage and low internal resistance type, giving 25 amperes on short-circuit. These characteristics together with its powers of rapid recovery after use, insure its long life and usefulness wherever this general type of battery is required.

Medford, Ore.—Experiments on the Sunnyside coal mine about three miles from Medford have demonstrated that it will produce illuminating gas and it is probable that it will be used by the Medford Gas Co. in place of crude oil, which is now shipped from California.

F. W. Topkin, of El Paso, Texas, is experimenting with this coal and finds that it will have valuable byproducts in the way of tar and asphaltum and as it is not of a sufficiently high grade to ship will be useful for gas companies.

COAL TRADE REVIEWS

GENERAL REVIEW

In spite of the changed weather conditions, the expected improvement in the hard-coal trade has failed to materialize. Production at the mines is heavy, perhaps close to any previous high record and the coal is being readily absorbed, but there is an absence of snap in the market and indications are strongly in favor of the situation becoming worse. There are rumors of concessions of from 25 to 50c. being offered on individual egg and chestnut, while even stove is selling at less than the circular; such conditions obviously make it difficult for the companies to maintain their regular circulars. Dealers are hoping for a continuation of low temperatures so that they will be able to dispose of their surplus egg and chestnut.

The Coastwise bituminous trade is a shade firmer, but all shippers have coal they are anxious to dispose of, and receipts are not being absorbed very readily. The market is characterized by a feeling of indecision and none seem to be able to formulate an opinion as to which way it will go; at present it is down to approximately a summer basis, and it is quite difficult to arouse any interest among the buyers. Only a few season prices have been announced so far, and contracting seems to be reserved for a later period. On inland contracts considerable business is being done, operators getting a slight advance over last year's figures. There also seems to be more activity there in the spot market, particularly in the North, where the movement on the railroads is quite uncertain; the Canadian trade is divided between a fear of both a surplus and a shortage because of the great uncertainty in the movement. There is little interest being displayed in contracts in the Pittsburgh district and contract prices are being slightly shaded on spot business; there is considerable inquiry, however, and prices are as good or better than formerly.

There is more activity in the Ohio field due to the lower temperature and the increased domestic demand; the movement is also slow and uncertain and shippers are convinced that the railroads are not prepared to do much in the face of adverse conditions, should these materialize. A considerable tonnage is being produced, dealers are busy and insisting upon immediate shipments, with the result that the downward tendency in prices has been checked and producers are holding firm at nominal quotations. In the South the weather continues favorable to a good domestic consumption, stocks are being depleted, and there is a good healthy demand generally. While the trade has not by any means been satisfactory so far this season, because of the unseasonable weather, stocks are rather low, and there is a fairly strong buying movement.

The cold weather in the Middle West has materially reduced stocks in the retailers hands and resulted in a rather concerted buying movement. The demand is unusual and all shipments are being readily absorbed. The Far Western market is in a doubtful condition, due to the impending change in the season; many dealers are putting in stop orders and will not again be interested in the market until next season.

BOSTON, MASS.

The New England market continues practically unchanged from a week ago. Bituminous is perhaps a shade firmer on account of the seasonable weather, but all the shippers have coal they are anxious to sell and the receipts at the piers have not been absorbed very readily. There is not so much doing on contracts as might be supposed; the uncertainty over transportation rates coastwise, is helping to put off closing business at season rates.

Water freights are firm at 95c.@\$1 on large vessels, Hampton Roads to Boston. On Long Island Sound barge rates for New York loading are down to 45@50 cents.

Pennsylvania coals are dull and season prices are not yet announced on any but a few of the more popular grades. Those are asking from 5@10c. more than last year, but it is doubtful if they can command it in view of the light demand that will probably prevail between now and September. The Georges Creek shippers have as yet made no announcement, but they are expected to be out for comprehensive business within a short time. There is a general air of indecision about the bituminous market just at this time and all hands seem to be wondering what moves to make.

All-rail there is little doing. Even fuel contracts seem to be reserved for a later time and the trade is so nearly on a summer basis that it is difficult arousing any interest on the part of buyers. Then, too, most steam plants are carrying over considerable stocks of what they have called their "reserve" during the winter months.

Anthracite trade from now until April will depend wholly on the weather. If the present cold spell continues there will be some orders for Eastern shipment, but if warm weather sets in soon it will be dull, indeed. Dealers are hoping for reasonable temperatures so they can work off the surplus supplies of egg and chestnut they took on earlier in order to secure stove. Some of the New York companies have receded from the 15c. advance on company barge freight, New York to Boston, and are making efforts to sell on the old 50@55c. basis. It will be interesting to see what attitude the same companies take Apr. 1. Pea size is still in short supply.

Wholesale quotations are about as follows:

Clearfields, f.o.b. mine.....	\$1.20@\$1.40
Clearfields, f.o.b. Philadelphia.....	2.45@ 2.65
Clearfields, f.o.b. New York.....	2.75@ 2.95
Cambrias, Somersets, f.o.b. mines.....	1.30@ 1.55
Cambrias, Somersets, f.o.b. Philadelphia.....	2.55@ 2.80
Cambrias, Somersets, f.o.b. New York.....	2.85@ 3.10
Georges Creeks, f.o.b. Philadelphia.....	2.87@ 3.10
Pocahontas, New River, f.o.b. Hampton Roads.....	2.70@ 2.80
Pocahontas, New River, on cars Boston.....	3.85@ 4.10

NEW YORK

Anthracite—The cold weather has been holding out more or less continually throughout the month and has resulted in an active business in the local retail trade. Conditions have also been favorable for a large distribution, and this branch of the business has been quite prosperous over the last two or three weeks. This prosperity has not, however, extended to the wholesale end. Practically all sizes are in easy supply with egg quite heavy. Premium coal is entirely unheard of, and with the individual cutting prices, the large companies are experiencing a great deal of difficulty in moving certain grades at circular; they are already putting some of these into storage, although this has not by any means become general yet.

Had it not been for the recent stretch of cold weather, it is difficult to say what condition the trade would have been in at this time. Production has been quite heavy at the mines, there being a plentiful car supply, while the petty strikes, which so seriously interfered with the output during last month, have not been so much in evidence. As a result shipments have been quite large and these, added to the reserve stocks accumulated by many dealers on speculation, make an enormous tonnage that the market has not been able to absorb.

New York quotations remain practically unchanged from last week. Price variations are noticeable both up and down, but average prices continue as before. We quote the nominal market as follows, with consignments possibly a little more difficult to obtain, and quotations a trifle firmer:

	Anthracite		Bituminous	
	Circular	Individual	West Virginia, steam	\$2.65@2.75
Broken*.....	\$5.00	4.75	Fair grades, Penna...	2.75@2.85
Egg.....	5.25	4.70	Good grade, Penna...	2.90@3.00
Stove.....	5.25	5.25	Best miller, Penna...	3.05@3.15
Chestnut.....	5.50	5.50	Georges Creek.....	3.25@3.30
Pea*.....	3.50	3.75		
Buckwheat*.....	2.75	2.50		
Buckwheat.....	2.45	2.35		
Rice**.....	2.25	2.25		
Rice†.....	1.95	1.90		
Barley†.....	1.75	1.20		

* Scranton and Lehigh. ** Scranton. † Lehigh and Schuykill.

Bituminous—The soft-coal market at this point continues off, and weak, in spite of almost three weeks of practically continuous low temperatures. While this has resulted in an active retail trade, it has not helped the large wholesalers. Large stocks have accumulated at tide which the companies are finding it almost impossible to move. Some of these have been standing for so long, that demurrage charges are piling up on them, and among these are some high priced coals.

For prompt delivery, the market is uncertain and irregular, with prices fluctuating a great deal, according to the urgency of the demand from the consumer. As a whole, quotations are off from last week for spot coal and buyers are displaying an entire absence of interest in the market. Much the same condition applies to contracting, although there has been some slight evidence of activity in this branch; only tentative figures have so far been advanced, and the market cannot, as yet, be said to be quotable. There are rumors of the operators holding out for from 10 to 20c. above last year's figures, but there is nothing definite of anything being closed at these prices, and it is highly improbable that they will be able to maintain this level for the season.

PHILADELPHIA, PENN.

Notwithstanding the changed weather conditions, the expected improvement did not materialize in the local market. Although there is considerable coal moving, and the output of stove, chestnut and pea seems to be readily absorbed, yet there is an unmistakable lack of snap in the trade, and this seems likely to continue, or grow even worse, unless unusual conditions prevail.

The reported strike of the firemen on all the roads leading into this city has not taken hold of either the dealer or the public as might be expected. It would undoubtedly bring about a distressing condition, if continued for any length of time, but there has been no apparent activity manifested so far. The papers are not giving any undue prominence to this matter, which undoubtedly has its effect on the public at large, but scare heads of a strike which would result in an almost complete tie-up of any additional supplies, would likely cause considerable commotion, and this would not apply to the anthracite business alone.

Taking the trade as a whole, it is inclined to be rather dull. Current gossip hints at cuts of anywhere from 25c. to 50c. per ton on the individual egg and chestnut coal, and stove is reported to be selling at less than circular. This is a condition that has to be met at this season, although earlier than usual this year, and with the added output of individual coal that has been turned loose on the market, owing to the recent decision of the Supreme Court, it makes rough sledding for the large companies who uphold the prices on their circulairs.

The bituminous market does not seem to improve in any respect, and coals that were being offered at from \$1.60@1.65 are now selling at anywhere from 25c. to 35c. less, and current reports indicate no immediate improvements.

PITTSBURGH, PENN.

Bituminous—Demand for prompt coal has improved, and especially the demand for slack. There is considerably more inquiry, and sales are more numerous, with prices fully as good as formerly, and in some instances better, while slack is quotably higher. Slack was rarely bringing above the circular price of 90c., but in the past week it has occasionally brought \$1.10, and \$1 has been done even on desirable tonnages. There is little interest in contracts. For prompt lots shading of the regular contract prices is altogether exceptional, while prompt slack, as indicated, is quotable at \$1@1.10. Contract prices remain as follows: Slack, 90c.; nut and slack, \$1.05; nut, \$1.25; mine-run, \$1.30; $\frac{3}{4}$ -in., \$1.40; $\frac{1}{2}$ -in., \$1.55, per ton at mine, Pittsburgh district.

Connellsville Coke—The coke market is beginning to show slight signs of a reaction after its precipitate decline in the past few weeks. Last week saw new low prices for prompt coke, \$2.25 being reached, though probably on indifferent grade, since \$2.50 has been obtained for standard grades in several instances. While there has been no negotiating of importance on contracts, it would appear in the circumstances that about \$2.25 would represent the closing basis were buyers and sellers able to get together on common ground. There is curtailment of production, both by some of the standard operators running only four or five days, as well as by some operations, those making inferior cokes, being forced to blow out ovens. The consensus of opinion in the trade is that the situation will have to be righted by this means, there having been coke produced in the past few months of such quality that it cannot be marketed at any price in normal times when consumers can choose. The using up of stock coke will have its influence also. Consumption all along the line is as heavy as ever. We quote: Prompt furnace, \$2.25@2.50; contract (nominal), \$2.25; prompt foundry, \$3; contract foundry, \$3@3.25, per ton at ovens.

BALTIMORE, MD.

Except for some contracting at an advance over last year's figures, the Baltimore market has been devoid of interest during the week. It is generally believed that practically all contracts will call for an advance of from 10 to 15c.

During the remainder of February, many contracts will be closed up here, but the majority of them will not be renewed until the latter part of March or around the first of April.

The supply of fuel at the present time is sufficient, but the demand is lacking. Consumers appear to be entirely out of the market so far as spot business is concerned. Consumers who wanted low-grade coal during the week had no trouble in getting it around \$1 per ton and even less.

The cold weather brought about a slight improvement in the demand for anthracite, but the market was by no means active, as many households were well stocked. West Virginia mines are still facing an acute labor shortage.

BUFFALO, N. Y.

For some time the Grand Trunk has been struggling with more coal than it could move. Occasionally it would take a large tonnage and seem to be out of its difficulties; then it would refuse everything again and allow the coal to accumulate at East Buffalo and Black Rock; it is reported that the East Buffalo yards are full of coal trains, made up for the Grand Trunk, ready to run over to it the moment it will take anything. Of late the Canadian Pacific has been taking so much coal that was routed over the Grand Trunk that it is also occasionally blocked.

The Canadian trade has been divided between an over-supply and a fear that the stocks would run out before the roads were back to normal conditions again; at last accounts there was still a surplus, but the demand was improving rapidly. Buffalo has not suffered in that way; in former years it was used as a dumping ground, but the local dealers became tired of having the market ruined by consignment coal and refused to handle it. Car service charges did the rest.

There is a heavy demand for bituminous and, if the production is not allowed to run away with the trade there is a good margin of profit in sight for both operator and jobber right along. It is generally conceded that this is going to be a good bituminous year, if only because of the necessity for readjusting wages again next year; some jobbers are already making calculations based on a shutdown at that time.

There is a disposition to accept the figures of the Pittsburgh Coal Co. as a basis of quotations here, merely adding the freight rate of \$1.25 to those prices as follows: Pittsburgh select lump, \$2.80; three-quarter, \$2.65; mine-run, \$2.55; slack, \$2.15, with Allegheny Valley 15@25c. lower. Coke is still declining, chiefly on account of having gone too high. Best Connellsville is quotable at \$5.50.

The anthracite trade is strong, but the excitement is gone. The cold weather has insured a heavy consumption and it is not quite late enough in the season for consumers to consider the possibility of being stuck with some of their stock. Only chestnut is at all scarce; the independents are getting a small margin on it. The Lehigh Valley Co. has begun to load its surplus egg into vessels, having loaded some two cargoes already.

COLUMBUS, OHIO

More activity developed in the coal trade in Ohio during the past week, due to lower temperatures which stimulated the domestic demand. Dealers in Hocking Valley coal were busy and insisting upon immediate shipment, with the net result that a considerable tonnage was produced.

One of the best features of the trade is the good demand from steam users. Factories are good buyers, and since the general industrial prosperity continues, are taking a larger tonnage than ever. Then there is a good demand from apartment houses and office buildings for steam sizes. Taking it all in all the trade is in excellent condition, and a complete recovery from the dullness of the past few weeks has taken place.

Retail business has been active and dealers are busy making deliveries. Some small advances have been made in quotations, but not sufficient to shut off buying in the least. The icy condition of the streets has interfered with deliveries.

Production in various Ohio fields has been rather good. In the Hocking Valley the output is estimated at about 85 per cent. of usual, and the same is reported from the Pomeroy Bend district; in eastern Ohio the output has been about 75 per cent. Little or no complaint has been heard of the lack of cars, although there is a shortage of motive power on some of the roads touching the coal regions.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump.....	\$1.50	\$1.50	\$1.50	\$1.50
$\frac{1}{2}$ -inch.....	1.35	\$1.20	1.40	1.30
Nut.....	1.50		1.25	
Mine-run.....	1.20	1.05	1.15	1.15
Nut, pea and slack.....	1.10		1.15	1.00
Coarse slack.....	1.00	0.95	0.90	0.90

CLEVELAND, OHIO

The situation in this district has improved to a large degree and prices continue to advance. The movement is slow and uncertain, and shippers are convinced that Northern carriers are not fortified against abnormal conditions. The trouble is most noticeable on shipments from the Youghiogheny district to points in this territory. This condition has caused considerable of a hardship to shippers and consumers; in many cases deliveries are 72 hr. overdue and public service and large manufacturing plants report their storage supply running dangerously low. All shippers are wire-tracing coal en route and have impressed upon the railroad people the necessity of better movement.

Mines in the Youghiogheny and Pittsburgh No. 8 district did not operate over 80% this week on account of the scarcity of railroad equipment, and operators are not assured of an increased supply for the present.

Wholesale quotations per net ton f.o.b. cars at the mines are as follows:

District.	Freight rate	1-in.lump	Mine-run	Slack
Youghiogheny.....	\$1.00	\$1.40	\$1.30	\$1.10
Pittsburgh No. 8.....	0.90	1.20	1.10	1.15
Goshen No. 6.....	0.70	1.35	1.25	1.30
Coshocton.....	0.70	1.55	1.35	1.30

Massillon domestic lump is quoted at \$2.50 f.o.b. mines. Pocahontas lump and egg is selling at \$2, run-of-mine \$1.25, and slack \$1.10. Hocking lump advanced from \$1.50 to \$1.60 mines. The coke market has weakened considerably, furnace coke has dropped to \$2.50 f.o.b. ovens; about 75c. is added for the foundry grades.

The downward tendency of prices has been checked and producers of Youghiogheny coal are firm in their quotations on contract business for the ensuing year. Inch and a quarter lump is quoted at \$1.55; three-quarter, \$1.40; run-of-mine, \$1.30, and slack, 90c., f.o.b. cars at the mines. Consumers do not seem to be overanxious to sign at these figures, but shippers claim they will not experience any difficulty in contracting for their entire production at these prices. The demand for Youghiogheny gas coal increases as the lake season approaches.

BIRMINGHAM, ALA.

There has been no material change in the local market during the current week. The weather continues to be gratifying to retailers, who are fast depleting their stocks. Incidentally, this condition is pleasing to producers of domestic coal who would surely have found trouble in inducing the dealers to stock up early had they not been able to dispose of the supplies on hand.

Many of the mines are having more or less trouble with water, but such trouble is not out of the ordinary at this season of the year. The foundry coke market has softened slightly, and while prices have not been reduced, orders are now being taken by the ovens with the promise of immediate shipment. Domestic nut coke can be had more freely, although prices remain very firm.

LOUISVILLE, KY.

A few operating companies and sales agents report some light and cautious storage on the part of dealers whose fall purchases were not sufficient to carry them through the months of November and December, during which time the car shortage was at its worst, and leave a surplus for the rest of the winter. The comparatively few dealers in this class have fared rather well, altogether, inasmuch as they have disposed of their stock coal at the regular winter prices, and are now enabled to supply their trade with coal purchased at phenomenally low figures, considering the date.

The best grades of block are quoted at \$2, while the second and lower qualities shade down to as low as \$1.50, especially in western Kentucky. Lump and block from the eastern Kentucky district is 10 or 15c. lower than the prices indicated for block, with a poor demand; for the best grades of round, prices vary from \$1.20 to \$1.40. Straight mine-run is quoted at \$1.10, and No. 2 at \$1. Nut and slack are in active demand, at prices ranging all the way from 75c. to \$1 and a little better, for the best grades, depending upon location and other factors, and from 60 to 75c. on second grades. A few sales are reported of Indiana screenings, as usual when the supply is inadequate on this side of the river; the sales agents of the river companies state they could dispose of practically their entire stocks of steam coal at good prices if they cared to do so at this time.

KNOXVILLE, TENN.

The last half of January and the first of February have been characterized by little or no demand for domestic grades, and what was promising to be one of the most prosperous winters in the history of the Kentucky-Tennessee field has

been turned into a most unsatisfactory one, so far as the last four weeks are concerned. However, that retailers have no stocks is revealed by the fact that a few cold days in succession quickly brought some orders for immediate delivery.

The demand for steam, especially the smaller sizes, has held up well, but they are not as high as they were 30 days ago. The active steel and iron market in the South assures a fairly good demand for steam, as considerable is used in making coke, thus relieving the commercial market, but the trade is taxed to take care of grades that ordinarily would be marketed as domestic coal.

INDIANAPOLIS, IND.

The cold weather has lasted about two weeks, with the temperature hovering not far from zero. Necessarily it has helped the coal trade by reducing stocks in the dealers' yards and among the larger users in factory districts where large piles are kept in reserve. The retail yards were well loaded before the cold snap came, sales having been quite restricted in January.

The optimists, both among operators and dealers, believe there is still to be some winter weather, and that retailers who stocked up heavily in October and November will be able to clear their yards. The smaller dealers who did not load up with coal in the fall, when cars were scarce and prices stiff, have been benefiting by the situation since the first of the year, buying at summer schedule practically and underselling the larger dealers 50c. to \$1 a ton. There is no trouble now about cars, the mines being promptly supplied.

The following represents closely the Indiana f.o.b. mine prices, Indianapolis f.o.b. prices being 50c. higher, to cover freight:

No. 4 mine-run.....	\$1.15	Domestic lump 5- and 6-in.....	\$1.65
Nos. 5 and 6 mine-run.....	1.05	Screenings, No. 4.....	0.80
No. 4 steam lump, 1½-in.....	1.30	Screenings No. 5 and 6.....	0.70
Nut, No. 4.....	1.40	Washed coal, Nos. 1 & 2.....	\$1.75@2.00
Egg.....	1.45	Brazil block.....	2.20
Domestic lump 2½-in.....	1.50		

DETROIT, MICH.

BITUMINOUS—Conditions at Detroit and in the southern part of the state have shown a marked improvement during the past week, owing to the cold weather that has recently set in. Steam trade still remains the strong feature at this time, and the domestic line has taken a decided increase in sales also in the past week. Operators in the south are beginning to make much larger shipments on steam coal, while the dealers on the other hand are getting rid of domestic stocks in a more satisfactory manner. The domestic line has improved to such a great extent that the retailers are now disposing of a great deal more fuel than was predicted they would.

	W.Va. Splint	Gas	Hock- ing	Cam- bridge	Pitts. No. 8	Poca- hontas	Jackson Hill
Domestic lump.....	\$1.50	....	....	....	....	\$1.75	\$2.00
Egg.....	1.50	....	....	....	....	1.75	2.00
Nut.....	1.40	....	\$1.50	....	....	....	....
1½-in. lump.....	1.25	....	....	....	....	....	....
2½-in. lump.....	1.15	\$1.15	1.20	\$1.20	\$1.20	....	....
Mine-run.....	1.05	1.05	1.00	1.00	1.00	1.25	....
Slack.....	1.00	1.00	1.00	1.00	1.00	1.10	....

Anthracite—The demand for this product is unusually heavy, and shipments do not seem as free as heretofore. Some of the operators are now charging a 60c. premium on all sizes, but if the weather should moderate, Detroit will be over-supplied with this grade.

Coke—All the ovens are working to their utmost capacity, and the demand is unusual for domestic coke. Quotations are advancing, and the product is bringing a top-notch price for this time of year. There seems to be a scarcity of Connellsville in this market, and it is being quoted at \$4.50 per ton, with Semet Solvay at \$4.25, and gashouse at \$4 per ton f.o.b. ovens.

CHICAGO

There has been an unusual demand in the Chicago market for coal, and regular shipments from the mines are being readily absorbed. There is continued strength in the steam trade. So far as smokeless coal is concerned, the demand is so heavy that dealers find it difficult to supply the trade. The market on mine-run is quotable all the way from \$1.25@1.40, f.o.b. the mines. The anthracite situation is stronger, while the coke market is slack.

Prevailing prices in Chicago are:

	Sullivan Co.	Springfield	Clinton	W. Va.
Domestic lump.....	\$2.47	\$2.07@2.32	\$2.27	....
Egg.....	2.47	....	....	\$3.95
Steam lump.....	\$2.12@2.37	1.92@1.97	2.17	....
Mine-run.....	1.95	1.97	1.97	3.30
Screenings.....	1.67@1.72	1.57@1.62	1.67	....

Prevailing prices for coke are: Connellsville and Wise County, \$6@6.25; by-product egg, stove, nut and gas house, \$5.75@5.85.

ST. LOUIS, MO.

Continued spring weather has left its mark on the trade during the past ten days; it has resulted in the closing down of many mines in the Carterville and Franklin County fields and others in the Standard and Inner District, and some of these operations claim that they will not resume work until some time next August or September.

In both the Carterville and Franklin County fields, as well as the Standard, coal is being sold below the cost of production. How long some of the operators can hold out with this policy is a question, and it begins to look as if some of the St. Louis shippers were skating on thin ice.

The prevailing prices, however, are:

	Carterville and Franklin Co.	Trenton and Big Muddy	Mt. Olive	Standard
2-in. lump.....			\$1.25	\$0.90 @ 0.95
3-in. lump.....			1.25	1.35 @ 1.10
6-in. lump.....			1.25	2.00
Lump and egg.....			1.25	1.00 @ 1.10
No. 1 nut.....	0.85			
Screenings.....	1.10			0.60 @ 0.65
Mine-run.....	1.20			
No. 1 washed nut.....	1.35			
No. 2 washed nut.....	1.30			
No. 3 washed nut.....	1.25			
No. 4 washed nut.....	1.20			
No. 5 washed nut.....	1.10			

Coke is strong at \$5.25 and up, and some smokeless is offered, but there is little moving.

MINNEAPOLIS—ST. PAUL

While the weather in the past two weeks has helped considerably in forcing the consumption of coal, it has not been of great benefit to the wholesale trade as far as demand and prices are concerned. The dealers in the country are benefitted to a certain extent, but they have not been able to clean up stocks and consequently there has been no occasion to order any coal. It is thought that a large percentage of the dealers in the Northwest will not be able to clean up their bins this winter and all grades of coal including anthracite will be carried over.

Prices on the various grades are hard to quote as the different mines in the different localities vary a great deal. Mines which have no contracts have flooded the territory with coal at low prices, while those that have, are only running part time and are in most cases, asking a fair price. Dock prices are steady, owing to the low stocks at Milwaukee and the head-of-the-lake points. Nearly all of the docks are swept clean and only here and there can be found any coal to speak of that is not under contract.

In the Twin Cities hard-coal stocks are low, especially in the nut size. One car of nut was received on track recently which had been passed at the docks through a stone crusher and before it could be switched onto the side track there was a line-up of from 15 to 20 dealers waiting to get at it.

OGDEN, UTAH

The market in the Intermountain territory is in a doubtful position. While there are no indications of an early spring, most of the dealers expect the demand for domestic coal to break soon, and they hesitate to get much in transit. A large number of small dealers who entered the market in the fall have discontinued shipments entirely, and will not again be in the market until next season.

The mines in Wyoming and Utah have caught up on all unfulfilled orders and have their salesmen out looking for business. Nut and slack coal are hard to dispose of, and quite a number of loaded cars are accumulating at the mines. The larger producers of the steam grades are now unloading at the mines, as there is practically no market for these grades. Nut should commence moving in the near future, as it is an excellent summer coal for use in ranges and small heating stoves.

FOREIGN MARKETS

GREAT BRITAIN

Feb. 7—Steam-coal market conditions are quiet and easy, on account of tonnage delays. Substantial reductions can be obtained by buyers who are in a position to nominate spot tonnage. For forward loading, sellers are holding firmly for higher figures. Quotations are approximately as follows:

Best Welsh steam.....	\$4.38@4.50	Best Monmouthshires.....	\$4.08@4.14
Best seconds.....	4.20@4.32	Seconds.....	4.02@4.08
Seconds.....	4.08@4.20	Best Cardiff smalls.....	3.60@3.66
Best dry coals.....	4.20@4.38	Seconds.....	3.18@3.42

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days—less 2½%.

GERMAN EMPIRE

The following is a statement of the German production, imports and exports during November, 1912:

	Production	Imports	Exports
Coal.....	14,805,443	1,002,271	2,551,839
Lignite.....	7,558,561	676,065	5,629
Coke.....	2,596,768	50,130	505,844
Briquettes.....	2,119,594	21,443	242,008

PRODUCTION AND TRANSPORTATION STATISTICS

CHESAPEAKE & OHIO RY.

The following is a comparative statement of the coal and coke traffic over the lines of the C. & O. Ry., for December, and the six months ending Dec. 31, 1911-12, in short tons:

Destination	December		Six Months	
	1911	1912	1911	1912
Tidewater.....	367,310	223,833	1,970,464	1,690,591
East.....	200,434	251,819	1,069,625	1,215,205
West.....	937,038	724,867	5,735,565	4,947,470
Total.....	1,504,782	1,200,519	8,775,654	7,853,266
Coke.....	17,557	23,544	110,597	134,936
From Connections				
Bituminous.....	23,204	65,984	117,326	241,000
Antracite.....	3,338	1,541	18,749	6,971

NORFOLK & WESTERN RY.

The following is a statement of tonnages shipped over this road from mines in West Virginia and the commercial and company coal, for the month of January, in short tons:

Field	Shipped	Tipple	Total	Com- mer- cial	Com- pany
Pocahontas.....	1,262,860	18,579	1,281,448	1,216,218	124,213
Tug River.....	191,896	4,021	195,917	158,209	37,708
Thacker.....	277,018	6,944	283,962	217,555	66,407
Kenova.....	78,371	5,620	83,991	72,573	11,418
Clinch Valley.....	.....	.....	.....	156,189	9,384
	1,810,154	35,164	1,845,518	1,820,744	249,130

Shipments of coke, entirely from the Pocahontas field, were 117,305.

COAL SECURITIES

The following table gives the range of various active coal securities and dividends paid during the week ending Feb. 15:

Stocks	Week's Range			Year's Range	
	High	Low	Last	High	Low
American Coal Products.....	.....	.....	94	94	94
American Coal Products Pref.....	.....	.....	109½	109½	109½
Colorado Fuel & Iron.....	39½	34½	36½	41½	31
Colorado Fuel & Iron Pref.....	.....	.....	155	155	150
Consolidation Coal of Maryland.....	102½	102½	102½	102½	102½
Island Creek Coal Pref.....	86	85	85	.....	.....
Lehigh Valley Coal Sales.....	240	204	204	.....	.....
Pittsburgh Coal.....	22½	20½	21½	24½	20½
Pittsburgh Coal Pref.....	91½	88½	89½	95	87
Pond Creek.....	26	24	25	28½	24½
Reading.....	165½	159	160	168½	159½
Reading 1st Pref.....	91	90	90	91½	90
Reading 2nd Pref.....	91	91	91	93	91
Virginia Iron, Coal & Coke.....	52½	50	50	54	50
Bonds	Closing Bid Asked			Week's Range or Last Sale	
	99	Sale	99	99	98
Colo. F. & I. gen. s.f.g 5s.....	107½	107½	107½	June '12	99½
Colo. F. & I. gen. 6s.....	84	Sale	84	84½	83½
Cons. Ind. Coal Me. 1s 5s.....	.....	.....	85	June '11	.....
Cons. Coal 1st and ref. 5s.....	95	.....	93	Oct. '12	.....
K. & H. C. & C. 1st s f g 5s.....	98	.....	98	Jan. '13	98
Pocah. Con. Coll. 1st s f 5s.....	87½	88½	87½	Feb. '13	87½
St. L. Rky. Mt. & Pac. 1st 5s.....	76	78	76½	76½	76
Tenn. Coal gen. 5s.....	102	103	103	Jan. '13	102
Tenn. Div. 1st consol. 6s.....	102½	103½	102½	Dec. '12	102
Tenn. Div. 1st g 6s.....	101	103	101	Jan. '09	.....
Cah. C. M. Co. 1st g 6s.....	.....	.....	110	.....	.....
Utah Fuel 1st g 5s.....	.....	.....	70½	70½	70½
Victor Fuel 1st s f 5s.....	79½	79½	79½	79½	79½
Va. I. Coal & Coke 1st g 5s.....	97½	98	97½	97½	98

American Coal—Dividend of 3% payable Mar. 1, to holders of record Feb. 28.

Colorado Fuel & Iron Co.—Dividend on preferred of 35% (on account accumulated dividends) payable Mar. 20, to holders of record Mar. 1.